Railway Age Gazette

Including the Railroad Gazette and the Railway Age

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
83 FULTON STREET, NEW YORK.

CHICAGO: Transportation Bldg. CLEVELAND: Citizens' Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....$5.00
Canada 6.00
Foreign Countries (excepting daily editions)..... 8.00
Single Copies.....15 cents each

Engineering and Maintenance of Way Edition and four Maintenance of Way Convention Daily issues, North America, $1.00; foreign, $2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

VOLUME 53. DECEMBER 20, 1912. NUMBER 25.

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THE discussions of the papers that have been presented to the American Society of Mechanical Engineers have rarely been marked by any very great degree of vigor, vim or interest, a condition due to the fact that there are such a variety of interests represented, and that so few specialists on any one subject could be brought together. So marked has this condition been that many members have been reluctant to present papers because of the improbability of their receiving worthy discussion. Evidently, however, this whole situation was based upon a wrong assumption, and it is possible to not only procure papers, but to have them discussed in a manner worthy of the name and standing of the society; but a deal of work must be done by some one to accomplish it. During the past year the committee on meetings has selected several sub-committees, each in charge of a different branch of the mechanical engineering field. As a result there were several meetings in session at the same time at the recent annual meeting, each of a highly special nature. Heretofore railroad topics have received but scant consideration. Men who were capable of writing on and discussing railway topics preferred to make their contributions to the purely railway associations. But this year an energetic railroad committee took hold of the matter, with the result that two most excellent papers were presented and their discussion followed with a breadth of view and an insight into the subject that has rarely, if ever, been equaled, certainly never before at any meeting of this society. It showed that there was a place for its work along lines that the Master Mechanics' Association has failed to touch. That association is so engrossed with the details of its work that it has never yet discussed the locomotive as a whole, as an engineering proposition. To be sure it has broadened out from the narrow field of individual details with which its earlier years were occupied, but it remained for this meeting of the American Society of Mechanical Engineers to show the real meaning of a broad and comprehensive grasp of the subject. It was a type of discussion for which we have been looking for a long time to come from the Master Mechanics' Association, and it shows that there is a real field of activity for this outside association, and one that cannot fail to be of very great value to the whole railroad world, if the same course is pursued that was followed at this meeting. And one feature of that course cannot be too highly commended. It was the limitation of the activity of the session to two papers. This did not burden the proceedings with more than could be well carried. There was ample time for discussion; most of the speakers had prepared their remarks in advance, and the net result was one on which the committee is to be congratulated, and of which the society may well be proud. Having thus shown that papers can be properly discussed, a new standard has been set, and it remains for the organization to live up to the reputation which it has thus established.

PRESIDENT MELLEN of the New Haven has advertised an offer of $10,000 to whomever shall first invent "an automatic device that will safely arrest an express steam locomotive that has passed danger signals." The proposition is qualified by the added condition that the money shall be paid only with the approval of the Massachusetts, the Connecticut and the federal railroad commission, and of one of three railroad companies, the Pennsylvania, the New York Central or the New Haven; and the railroad's approval may come as late as December, 1915. Mr. Mellen will probably get plenty of responses to his offer. The first inventor of a device meeting this specification may be hard to find, as his invention appeared 25 years ago. The device was described in a catalog of the Union Switch & Signal Company issued in 1889 (page 284), and the name of the inventor was modestly omitted. Another efficient device has been in use on the Boston elevated for ten or a dozen years, in the New York subways eight years, and in the London subways about three years. Does anyone question the entire fitness of these stops to act under like conditions as well on a steam locomotive as on any other vehicle? Other devices to be found in regular use in the states

of Washington and California on electric cars are just as good for steam engines. And what is the matter with the Harrington stop in use on the Erie? The cab signal of the Great Western Railway of England has been used with entire success to stop steam locomotives without the intervention of the runner. As for the "adoption" of a stop by any one of the three roads named by Mr. Mellen, the value of that term depends somewhat on the extent to which the device is used. The Pennsylvania and the Long Island also already have adopted an efficient stop for use at a number of places in and near New York. To adopt it all over the line might be too much to expect even in three years. Again, why does the New Haven road confine its requirement to express locomotives? Judging by the action of the road in the matter of crossovers, the aim is to completely safeguard its passenger trains; but to do this the freight engines need attention as well as those used on passenger trains. A freight sometimes runs into a passenger train. To set up at the side of the road an apparatus which will stop some trains and not others is to discredit and possibly nullify the block system. An important element of safety is uniformity of practice—the providing of the same apparatus and the same processes and regulations for all trains at all times, as far as possible. One of the marked advantages of the use of the block system is the putting of all trains into the same class. To meet the approval of a governmental commission an automatic stop should go beyond the block system, not stop short of it. It should be designed (1) to protect every train, that is, to stop any kind of train; (2) should be applicable to all danger points; (3) should detect its own failures; (4) should withstand bad weather, frost, heat and violence, as effectually as does the track itself, and (5) should be proof against being tampered with by a lazy engineman. There are numerous other essential requisites, but these are enough to suggest the need of amplifying Mr. Mellen's specification, if he is going to promote real progress. That second point, alone, has caused signal engineers many nights of anxious study, but they have not mastered it. The third suggests that a long series of tests will be necessary. Ten thousand dollars would be a very inadequate sum to meet the cost of such tests. The fourth problem must be settled by the road itself. Success depends on this, and it is not a laboratory problem. The fifth condition may not apply on a road where all enginemen are conscientious; but it is one that has had to be considered in connection with all things of this nature heretofore. On the whole, Mr. Mellen's Number 3 will be received with interest but everybody that is interested will hope that he will substantially amplify it.

THE COMMISSION AND REGULATION OF OPERATION.

EVIDENCE accumulates that the Interstate Commerce Commission desires an increase in its authority over the physical operation of railways. Chairman Prouty, in his address to the National Hay Association of Kansas City last July, touched on one phase of the matter. He indicated that under the law as it now stands the commission lacks power to take steps to compel railways to provide adequate facilities to handle their freight traffic. Other commissioners more recently have mentioned the commission's want of authority to issue some kinds of orders regarding improvements in the physical plants and operating methods which they deemed necessary to increase safety.

The commission, through the authority it possesses to fix rates, now controls the gross earnings of the railways. It also has considerable authority over operation. For example, it specifies the safety appliances to be used, and investigates and makes reports regarding accidents. Congress has passed some legislation regulating operation; notably, the hours-of-service law, the law regarding the transportation of explosives, the Erdman mediation and arbitration act, and the ash-pan law. Other operating measures are pending in Congress, as, for example, full crew bills and bills to require the installation of block signals. Furthermore, the state legislatures are passing many laws to regulate operation. The board which arbitrated the controversy between the eastern railways and their enginemen recommended the creation of national and state wage commissions to regulate the wages and conditions of work of railway employees.

On first thought, it would seem logical, and right as a matter of principle, that if there is to be regulation of the physical operation of railways it should be done by the same body that regulates their rates. As the regulation of the rates charged determines what the gross earnings shall be, so, to a large extent, regulation of operation determines what the operating expenses shall be. The difference between the gross earnings, and the taxes and operating expenses, is what the railways have left to pay a return on their investment. The amount of net that they have left determines directly and indirectly what they can invest in the intensive and extensive development of the properties. Therefore, the body that regulates the rates should always have in mind the expenses that the roads must incur, and the body that regulates operation, and thereby the operating expenses to be incurred, should always have in mind what the roads are permitted to earn.

This is not the case now. The interstate and state commissions regulate rates, and to some extent operation, Congress and the state legislatures regulate operation, and arbitration boards regulate wages and conditions of employment; and each acts to a considerable extent in disregard of what the other is doing. The Interstate Commerce Commission has not always shown wisdom, or even fairness, in exercising the authority it already possesses over operation. In the investigation of accidents and the inspection of safety appliances it has committed the great fault of employing members of the railway brotherhoods; and the reports made by its investigators commonly have been neither expert nor fair. Nevertheless, it does seem that if there is to be comprehensive regulation of operation, the regulating ought to be done by the Interstate Commerce Commission. If both income and outgo are to be regulated one body should do it, and thereby be put in a position where it will constantly see both sides of the ledger. If there is to be regulation of operating rules the commission ought to regulate them. If there is to be regulation of block signaling the commission ought to do it. If there is to be regulating to insure the adequacy of facilities the commission ought to do it. If there is to be regulating of the wages and conditions of work of employees it would seem, by the same token, that the commission ought to do that.

Suppose the commission were given this great power. It is not usually the strong and rich roads, but the weak and poor ones, that do not provide adequate facilities and put their properties in safe condition. These, therefore, are the roads to which the commission's orders regarding operation would apply most frequently and with the greatest force. They might not have the means to make the expenditures for improvements ordered by it, and at the same time pay the wages and incur the other operating expenses required. They might justly demand that as the government was imposing burdens on them it should enable them to raise the capital necessary to carry them by guaranteeing a return on it. The very conditions which might make it necessary for the government to guarantee the interest on the securities issued probably would, in many cases, also make it necessary for the government to pay the interest. In most of the countries of Europe the governments early adopted the policy of regulating operation as well as rates, and it did become necessary in those countries for it to guarantee the interest, and it did later become necessary for it to pay the interest. This was true, for example, in most of the German states, in France, in Austria, in Hungary and in Italy. What was the result? Many of the railways in these countries became heavily indebted to the governments, and the governments finally took them over and began operating them itself, largely in order to avoid losing the money it had advanced. The most recent example is that of the Western Railway of France, which was taken by the French government chiefly because its debt to the gov-

ernment had become so large it was evident it never could be paid.

Mr. Prouty in his speech at Kansas City indicated that a severe shortage of railway facilities and congestion of traffic might precipitate government ownership in this country. He implied that permitting the railways to earn adequate returns and giving the commission power to regulate operation were necessary to prevent the shortage of facilities, he feared, and thereby to protect us against government ownership. Every increase in government regulation in this country has been advocated as a means of preventing government ownership. And it will not be surprising if the future historian of our times writes that most of the regulation adopted hurried us along toward government ownership. What the results of giving the commission much the same authority over operation that it has over rates would be would depend on how the power was exercised. And the power would not be wisely and beneficially exercised unless the members of the commission—or at least some of them—showed more disposition to inform themselves and act wisely—and talk wisely—regarding operating matters than they have in the past, and unless the commission employed a very different class of operating "experts" from those it has now.

THE NEW HAVEN AND NEW ENGLAND.

AT a time when the public and even the more radical daily newspapers are beginning to understand more fully the difficulties and problems of American railroads, and to appreciate in some degree the efforts railroad managers are making to overcome these difficulties and solve these problems, there has come an outburst of bitter criticism and accusation against the New York, New Haven & Hartford. Even the New York *Evening Post,* generally considered one of the most sane and reliable newspapers, has, following the lead of Louis D. Brandeis in Boston, carried on in its news columns an attack against the New Haven, and its president, Charles S. Mellen, that in flagrant misrepresentation has seldom been equaled. New England, from the governors to the preachers, is aflame with more or less righteous indignation.

The New England situation is not only important in itself, but may have an important influence on the public's relations with the railroads throughout the country. The newspaper attacks, as usual, partly reflect and partly aim to mold public opinion. The attacks are not spontaneous. In October the New Haven had a serious accident at Westport, Conn., caused by an engineman's taking a crossover at excessive speed. Soon afterward there were two other accidents, one due to a defect in a frog, the other, to a defect in the equalizer bar on a dining car. At about the same time the Grand Trunk stopped work on the Southern New England, which it had been building through New Haven territory to Providence, R. I. That these things all happened within two months is a coincidence. But that this coincidence aroused a storm of agitation indicates that it was rather the immediate than the main cause of the storm.

The New Haven has a virtual monopoly of transportation in New England. The economic opinion of our day favors rather than opposes monopoly in the railway business, because it is believed that, under able and public spirited management, monopoly can secure greater efficiency than unrestricted competition.

Railway efficiency is the rendering as economically as may be practicable in the circumstances of such service as the public interests require. The New Haven has a traffic which is almost unique in the United States. Its freight density just about equals that of the railways of the country as a whole, but the traffic is largely manufactures and merchandise, which load lightly and move relatively short distances, its average haul being 95 miles. Nevertheless, the Mellen management has increased the average trainload, from 218 tons in 1903, to 294 tons in 1912. This reflects a marked increase in economy in the handling of freight. The New Haven's passenger density exceeds that of any other steam railway in the country, except, we believe, the Boston & Albany, and amounts to about 800,000 passenger miles per mile. The difficulty and cost of handling a given passenger density is much greater than of handling a given ton mileage. Although the New Haven's passenger mileage is only about three-fourths as great as its ton mileage, it has to run twice as many passenger as freight trains. The Mellen management has succeeded in materially increasing the number of passengers per train, and thereby prevented the cost of handling passenger traffic from increasing as much as it otherwise would. It cannot be successfully attacked on the ground that it has not increased economy of operation.

But it is said, the road's service is poor. Its freight service has recently been the subject of investigation by Chairman Prouty of the Interstate Commerce Commission. The Boston Chamber of Commerce, the chief complainant, sent 10,000 letters to shippers that it thought might have grievances, and got 700 replies. Each voiced a complaint, but there was hardly any one thing of which a majority of the shippers complained. Prof. Bruce Wyman of the Harvard Law School, an eminent authority on the law of public service corporations, in an article in the Boston *Evening Transcript* of November 8 entitled "Speeding up the Freight Train," discussed the conditions disclosed by the investigation. He said that "the Chamber had more than vague letters with which to confront the railroads; for witness after witness took the stand and voiced his protest. Some of them were the officers of trade associations, knowing, in many instances, little of what they spoke. Many of them were of the earnest class, which the clever Wells has recently named the 'Godsakers'; the men who get up in every assemblage saying 'These conditions are intolerable; for God's sake let's do something.' Others, instancing one package much delayed in transit, went so far in the heat of testifying, as to call their whole service intolerable when the fact was that it was 99.44 per cent. pure. But some of them were shippers with grievances of which they had record to show, and these complaints deserve the very careful attention which they received." Prof. Wyman decided that the averages showing how nearly the movements of freight came to the normal transit "were so striking as to make it hard to believe that there can be anything fundamentally wrong with the forwarding system. Averaging these averages to avoid statistics, fully 90 per cent. of all shipments got through practically in normal time." He concluded "that the truth of the matter is that the business of the railroads in New England has outgrown the facilities." He believes "there can be no real solution of our transportation problem until we are ready to treat New England as an operating unit." He thinks the New Haven should be allowed to go ahead and develop its policy of monopoly, but that the Interstate Commerce Commission should be given the same power to hear complaints and issue orders regarding specific shortcomings of service that it now has to hear complaints and issue orders regarding specific shortcomings of rates. He expresses the opinion that many of the criticisms now made regarding freight service are incidental to the period of readjustment, and that the New Haven management is moving in the right direction to apply the remedy, although there is much justice in many of the complaints.

Regarding the New Haven's passenger service, it is charged that the accidents that recently have occurred show that it is not safely operated; and also that its passenger equipment is defective. The primary cause of its bad accidents has not been its crossovers or its wooden passenger equipment, as many think, but want of proper discipline among its employees evidenced by disobedience of the rules. Of course, want of discipline is a reflection on a railway management. Without this condition the passenger equipment and crossovers would not have contributed to the accidents so much discussed. Since the Westport wreck it has frequently been asserted in the daily papers that the roadbed of the New Haven is in wretched condition. This is not a fact. The roadbed of the New York division, on which the Westport wreck occurred, compares favorably with that of the main line of the Pennsylvania Railroad between Philadelphia and Pittsburgh. The New Haven is one of the few roads in the

country that have adopted screw spikes and have been putting them in on any large scale. Most of the structures on the main line of the New Haven are new and of the most modern standard.

The New Haven's passenger service and equipment, however, are not as good as its roadbed. The management, in this matter —as in a good many others—has been remarkably regardless of public opinion. It never seems to have occurred to Mr. Mellen that his road is serving a public where the standards of living are higher than in almost any other part of the country, and that therefore there is bound to be a persistent demand for railway passenger service of a corresponding character. When compared with the standards set by many railways, both East and West, the New Haven's passenger equipment and much of its service are open to serious criticism, and it is significant that railway officers from other parts of the country speak hardly less disparagingly of them than do the New Haven's regular patrons. On the other hand, the service between terminal points, as between New York and Boston, is very satisfactory in point of frequency; and it is not without significance that, while the people of Boston and vicinity are the severest critics of the road's service, thousands of them use its suburban trains for very short trips in preference to electric lines.

If you quiz a New England critic of the New Haven long enough you will find that the real gravamen of his indignation is not merely that the Mellen management has sought and practically secured a monopoly, but that it is felt that it has abused the power of monopoly. Evidence of this abuse cannot be found in the rates. The New Haven's average rate per ton per mile was 1.45 cents in 1900 and 1.37 cents in 1912; and its average rate per passenger per mile in 1900 was 1.78 cents and in 1912 1.72 cents. In other words, while the wages the Mellen management has had to pay to labor and the prices it has had to pay for materials and equipment have gone up, both its freight and passenger rates have declined. However, wherever there is a monopoly there is suspicion that it is being used for the sole benefit of the possessor. Therefore, to get along with their patrons, monopolies must treat them even more diplomatically than competing concerns must. And Mr. Mellen is exactly the man not to do this.

He is an extraordinarily strong man, and also a very arbitrary one. In taking the management of the New Haven he assumed heavy responsibilities to his stockholders and undertook the operation of a property desperately in need of potent and progressive management. He was fully capable of doing the improvement work needed. His courage and his knowledge of what a modern railroad should be never failed. But his courage was of a kind that could not explain itself, or did not want to. He is one of those men who should have been born a pope or a czar. If he had been diplomatic, he would have made clear long ago to the people of New England, not only that he was seeking to establish a transportation monopoly, but the reasons; and why not only the railway but the public might benefit by it. But Mr. Mellen is seldom a talking man, and when he does talk he is apt to put a sting in his remarks which will incense rather than conciliate. His curt manners and arbitrary methods have made him numerous enemies among those who have had business dealings with him. When he has felt that radical changes should be made in the service of the road he often has not considered what other people might think about them, but has made them first and found out what other people thought afterward; and very commonly he has found that they thought very ill of both the changes and of their maker. The New Hampshire commission recently made a searching investigation of the New Haven's affairs, and gave the management a clean bill of health for integrity. If Mr. Mellen had been a little less of an individualist and a little more of a diplomat in his attitude toward public opinion, the clean bill of health given by the New Hampshire commission would have been relatively less important.

One of the best means a railway management can use for reaching an understanding with the public is frankly to take the public into the management's confidence and tell it what the management is aiming to do and how it is trying to do it. And, as the public has a long memory, it is very needful for a railway to absolutely live up to its advance notices—a thing the Mellen management often has not done. The presidents of the railways of the United States have been learning in recent years that nothing is more unprofitable than to ignore or defy public sentiment. This knowledge was earliest acquired by the presidents of lines in the west where the movement for regulation of railways was born. It was gained next by the presidents of the more eastern roads. And it is now Mr. Mellen's turn to become a learner. It is to be hoped that he will prove an apter pupil than past developments would indicate. Mr. Hill and Mr. Harriman learned late in life to be railway statesmen as well as great railway executives. Mr. Mellen might well take a leaf from their experience.

NEW BOOKS.

The New Competition. By Arthur Jerome Eddy. Published by D. Appleton & Company, New York. Price, $2.00.

Mr. Eddy squarely disputes the fact that competition is the life of trade. He acknowledges that the survival of the fittest may be a law clearly recognizable in the study of biology, but refuses to apply this law to economics. He holds that in present day conditions the acceptance of a principle which is founded on a conception of business as a warfarer is not only barbarous but an anachronism. A conception of business which recognizes competition as its principal moving force is a doctrine of destruction and not construction. Mr. Eddy believes that co-operation should be recognized as the life of trade, and that this principle is becoming more and more the guiding force which is determining business conditions. Competition carried to its logical conclusion leads to the destruction of all but one competitor. The attitude of the labor unions in refusing to permit their members to compete against each other; the attitude of farmers' protective associations in urging their members to combine so as to protect those who are under an economic disadvantage not only against the wholesale dealer outside of the organization, but against undue competition from the stronger members of the association, are held up as examples of the recognition of an ethical fact, which is diametrically opposed to the survival of the fittest. Mr. Eddy goes so far as to assert that almost every class in society recognizes the value of, and desires co-operation, at least as between members of its own class. Mr. Eddy finds that the Sherman anti-trust law is entirely indefensible. Mr. Eddy is not a socialist. He uses many of the arguments of socialism to support his doctrines and to defend combinations of capital.

There is one point that he brings out strongly and clearly, and that is that there is no consumer class; that to each man the importance of what he receives as a producer far outweighs any advantages that he might derive as a consumer from cut-throat competition as between producers. He makes the point that while the community at large receives a part of the benefits of co-operation, they have to bear the entire burden of the cost of competition. The book is interesting in the light of the recent decision of the Supreme Court in the Harriman lines merger case, because in that particular merger the advantages derived by the public from co-operation were more obvious than is often the case where combination has taken place on a very large scale. Mr. Eddy's book is of interest to railroad men because the transportation field was one of the first in which the evil effects on the general community of unbridled competition were generally recognized. The book is unnecessarily long; the points in it are well taken; the argument is logical and the author shows a broad knowledge of present day conditions; but the expression of these facts would readily bear condensation. Moreover, the book is annoyingly chopped up. Each chapter is divided into numerous parts and each part is composed of short, almost staccato, paragraphs. This is unfortunate and takes away from the pleasure of reading the book; but it should not be allowed to obscure the really careful and thorough analysis that is made of business conditions, or the clear exposition of the fallacies that underlie the *laissez faire* theory of economics. The book marks a real contribution to economical literature.

WHY 5,000 TRESPASSERS ARE KILLED YEARLY.

Data Regarding 4,785 Arrests Shows Inefficient Government Is Responsible; Better Laws and Their Enforcement the Remedy.

Commissioner C. C. McChord, of the Interstate Commerce Commission, in an address at the Co-operative Safety Congress of the Association of Iron and Steel Electrical Engineers at Milwaukee, Wis., on October 1 gave figures showing that in the 20-year period 1890 to 1909, inclusive, fatalities to trespassers constituted 53.09 per cent. of all the fatal accidents on the railways of the United States. He pointed out that the total number of persons killed was 163,171, and that of these 86,733 were trespassers. The Interstate Commerce Commission has given no figures regarding trespassers killed in 1910, but its statistics show that in 1911 there were 5,284, or 52 per cent. of the total fatalities. Therefore, the proportion of trespassers killed to the total persons killed is being maintained.

The problem of reducing accidents is probably the most important problem with which railway managements, employees, regulating authorities and the public are today confronted. When it is found that a a clear majority of all fatalities occurs to one class it becomes manifest that the most important part of the accident problem is that of reducing fatalities to these persons. Unfortunately, as the *Railway Age Gazette* often has pointed out, a very great deal more attention has been given to accidents to other classes than to this one. Doubtless this has been because the number and proportion of fatalities to trespassers has not been generally known and their causes have not been understood. Some have charged this class of accidents against the railway managements, and indicated that if they would properly police and fence their tracks and eliminate grade crossings the situation would be improved. Railway officers have replied that the real trouble is that there are few laws and ordinances relating to trespassing on railway property and that those there are are not enforced.

To get at the facts and so present them that the true state of the case and the necessary remedies may be made clear beyond question the *Railway Age Gazette* has obtained a great quantity of information regarding the arrests of trespassers, who they are, by whom they are arrested, what they were doing, what charges were made against them, before what courts they were arraigned, what disposition was made of their cases and what the existing laws on the subject are. The information regarding arrests relates to arrests made mainly in June, July and August, 1912, and was gathered through the office of the chairman of the General Managers' Association of Chicago. It has been furnished by the following railroads: Chicago Great Western, Atchison, Topeka & Santa Fe, Pennsylvania Lines West of Pittsburgh, Grand Trunk, Rock Island Lines, Baltimore & Ohio Chicago Terminal, Baltimore & Ohio, Northern Pacific, Michigan Central, Lake Shore, Chicago & North Western, Chicago & Alton, Chicago, Burlington & Quincy, Indiana Harbor Belt, New York, Chicago & St. Louis, Erie Railroad, Chicago & Western Indiana and Belt Railway of Chicago and Chicago Junction Railway. It covers 4,785 arrests made on these railways which run through most parts of the United States. The information obtained, therefore, reflects conditions throughout the country.

TRESPASSING DUE TO INEFFICIENT GOVERNMENT.

One of the main purposes of governments is to protect citizens in their property rights. The owners of railways are citizens, for many legal purposes the corporations are citizens. Therefore, the property of railways is entitled to the same protection from intrusion as any other property. In order to protect the property of citizens the governments levy taxes. In proportion to the value of their properties railways are among the largest tax payers. Therefore, it is the duty of governments to protect the property of railways against trespassers from the same funds, and to the same extent, as the property of others. The facts show that practically no effort is made by public police officers to keep intruders off railway property. It is necessary for railroads to maintain their own police; and almost without exception the 4,785 trespassers arrested were arrested by the railway police.

Another important function of the government is to protect the lives and limbs of citizens. Trespassers are citizens. Every public official knows it is dangerous for people to trespass on railway property. But the information collected shows that the governments, national, state and municipal, make little effort to protect the lives and limbs of citizens from the hazards of trespassing. Every one of the persons was risking losing limb and life when arrested; and yet, of this total number only 2,183 received any punishment; and in many cases the punishments were so slight that they could have little tendency to deter the offender from repeating his offence.

THE REMARKABLE SITUATION IN CHICAGO.

The evidence shows that the elimination of grade crossings is almost futile as a means of preventing trespassing. The railways of Chicago in compliance with city ordinances have spent about $70,000,000 on track elevation, and expect to spend a total of $150,000,000. Yet trespassing *on their elevations* goes on daily, and this, despite the fact that there is a specific city ordinance prohibiting trespassing on the elevation. Trespassers on the elevation are arraigned before the judges of the municipal court. In the three months under review there were 339 arrests on the elevated right of way of only four systems, and the following table shows the disposition of the cases by the municipal court of Chicago:

	Arrested.	Punished.
Pennsylvania Lines West of Pittsburgh.....	172	32
Chicago & Alton.....	15	None
Chicago, Burlington & Quincy.....	52	7
Chicago & North Western.....	100	28
	339	67

In other words, less than one-fifth of the persons arrested for the specific offense of trespassing on the elevations were given any punishment. The elevation of the Chicago & Western Indiana and the Belt Railway, is used by several roads. The records of the Western Indiana and Belt Railway do not refer specifically to trespassing on the elevation. They do show that during the period mentioned there were 160 arrests for trespassing which was not accompanied by any other offense. Doubtless, at least three-fourths of these arrests were for trespassing on the elevation; and in 95 of the cases the culprits were completely discharged; in 38 they were paroled, and in four they were turned over to the juvenile officer. This accounts for the disposition of 137 out of the 160 cases.

It is, therefore, a safe inference that in not more than 20 per cent. of all the instances where arrests are made for trespassing on the elevation of the railways in Chicago is there any punishment. In other words, the elevation of tracks has not prevented trespassing, and the municipal court does extremely little to make effective the ordinance that was specifically enacted to protect the property of the railways from intrusion and the lives and limbs of the trespassers themselves from the results of their folly. The fact that the trespassing continues in such large volume shows the indifference and futility with which the public authorities of Chicago deal with this matter. There have been so many cases of trespassers in Chicago throwing stones at the passenger trains of the Chicago & North Western, which sometimes have passed through windows and struck passengers, that this road has put its own police on both

night and day. And it is this same government of Chicago which enforces its laws in a way that would be a subject for humorous paragraphs in Dahomey or Timbuctoo that has made the railways spend $70,000,000 to elevate their tracks *in the interest of public safety*, and will make them spend enough more to raise the amount to $150,000,000!

JUDGES WHO ARE SENSITIVE ABOUT ARRESTS, BUT CALLOUS REGARDING KILLINGS.

The attitude of some of the municipal court judges of Chicago is illustrated by the fact that in one case where a railway special officers arrested 21 men on the elevation, the judge told him he should make no further arrests for trespassing, but should secure the names of offenders and later have them summoned into court. Probably in no other civilized country can there be found public officials whose hearts are so tender that they are pained more by having men arrested than by having them killed.

GOVERNMENTS DO LITTLE ANYWHERE.

While the situation in Chicago is bad it is not much better in other parts of the country. The records show that the public officials of cities and towns are usually very reluctant to arrest or punish trespassers. In small places it is common for the courts to impose on them a suspended sentence, and give them a stated number of hours to leave town. Naturally, many of them go out as they came in—viz., on the tracks of the railways. To so great an extent is it impracticable to get persons punished for trespassing alone, that the railway police, whenever possible, arraign them on some other charge, as malicious mischief, or disorderly conduct, or vagrancy.

Investigation shows that, contrary to the general belief, most of the trespassers killed are not tramps, but citizens of the communities where they are killed. It would, in most cases, be futile for the railway police to arrest citizens of standing merely for trespassing; and ordinarily, of course, they cannot be arrested for anything else. Therefore, in a large majority of trespassing cases no arrests are made; and the large number of arrests made is but a slight indication of the amount of trespassing done.

The following table shows the number of arrests of trespassers and the number of punishments reported:

	Number Arrested.	Number Punished.
Chicago Great Western	121	78
Atchison, Topeka & S. F. Coast Lines	95	26
Atchison, Topeka & S. F. Western Lines	111	43
Atchison, Topeka & S. F. Eastern Lines	41	35
Pennsylvania Lines West of Pittsburgh	422	234
Grand Trunk	240	129
Rock Island Lines	38	37
Baltimore & Ohio, Chicago Terminal	302	30
Baltimore & Ohio	1,465	816
Northern Pacific	33	19
Michigan Central	25	23
Lake Shore	152	94
Chicago & North Western	131	34
Chicago & Alton	96	64
Chicago, Burlington & Quincy	93	39
Indiana Harbor Belt	18	9
New York, Chicago & St. Louis	473	227
Erie Railroad	726	215
Chicago & Western Indiana and The Belt Railway of Chicago	174	28
Chicago Junction	29	3
	4,785	2,183

The facts about the situation will, perhaps, be made most clear by giving detailed statements for several railways, based on the reports made by them.

CHICAGO & ALTON.

The record of the Chicago & Alton shows that the majority of its trespassing cases are those of minors who have been arrested on the track elevation in Chicago. In such cases a representative of the road usually gives the parents a warning to keep their children off the elevation. The road also has cards printed in different languages, giving the provisions of the juvenile law, which are left with the parents at the time they are notified.

Number Arrested.	Cause.	Disposition.
57	Trespassing	17 sent to jail.
		4 sent to jail over night.
		10 fined $50 and sentence suspended.
		8 fined.
		2 returned to state institution.
		1 returned to parents—feeble-minded.
		9 discharged.
		1 paroled to probation officer.
		2 paroled to juvenile officer.
		2 paroled.
		1 sent to John Worthy School.
3	Disorderly conduct	1 fined.
		2 sent to jail.
8	Vagrancy	8 sent to jail.
13	Riding trains	2 bought tickets for passenger trains.
		8 fined.
		2 sent to jail.
		1 jail over night and dismissed.
15	Trespassing on elevation	6 discharged.
		9 taken home and given warning.

Total arrested, 96; total punished, 64.

PENNSYLVANIA LINES WEST OF PITTSBURGH.

No railway management in the country has done more to reduce trespassing and the accidents it causes than that of the Pennsylvania system. On the lines west of Pittsburgh, as on the Pennsylvania Railroad, the road's police adapt themselves in their work to local laws and conditions. On the Northwest system all persons arrested in Chicago are prosecuted under the city track elevation ordinance. In Illinois there is no state law under which offenders can be prosecuted for trespassing on tracks at grade. In Indiana the road prosecutes under the state trespass law, but it must notify the trespasser to keep off before it can proceed against him. In Ohio prosecutions are made on the petit larceny charge when possible. Trespassers arrested riding trains are charged with violating the railroad law.

On the Eastern Division in Pennsylvania, trespassers caught riding trains are prosecuted under the trespass law. In all cases of train riding the person is arrested without warning. In cases of walking on the right of way the officers explain the danger and serve trespass notices. Before a legal arrest can be made in Pennsylvania, it is necessary that the property be posted according to law.

On the C. & P. Division, the greatest amount of trespassing is in the Cleveland district, and the road's police can only warn and serve notices, as the city police will not lock up any person charged with trespassing. Parties arrested for train riding and charged with violating the railroad law are usually discharged or let off with a suspended sentence.

On the Toledo, Akron and Marietta divisions of the Central System the railway police who find people loitering around the yards and stations, order them away and serve regular trespass notices. The railway's patrolmen are required to ride freight trains. Men arrested for train riding are usually taken before the mayor of the town, and sometimes they are fined and sometimes released with a reprimand.

Number Arrested.	Cause.	Disposition.
94	Trespassing on train	42 fined.
		26 sent to jail.
		22 discharged.
		1 sent to workhouse.
		2 sent to reformatory—suspended.
		1 juvenile court.
86	Trespassing on elevation	16 fined.
		9 paroled to juvenile officer.
		4 paroled.
		57 discharged.
126	Trespassing	26 sent to jail.
		22 discharged.
		1 sent to workhouse.
		1 sentence suspended.
		54 fined.
		9 reprimanded.
		1 sent to reformatory.
		5 turned over to probation officer.
		4 no record.
		2 given one hour to leave town.
		1 returned to infirmary.
18	Loitering	3 open docket.
		3 fined.
		5 discharged.
		1 sent to jail.
		6 released on probation.
4	Interfering with R. R. property	4 reprimanded.
5	Sleeping on train	3 released.
		1 fined.
		1 sentence suspended.

Number Arrested.	Cause.	Disposition.
24	Riding trains	14 fined.
		1 open docket.
		3 sent to workhouse.
		4 reprimanded.
		2 dismissed.
7	Malicious mischief	2 fined.
		1 sent to reformatory.
		3 turned over to probation officer.
		1 released.
5	Picking coal	1 released.
		3 fined.
		1 turned over to probation officer.
29	Violating R. R. law	7 sentence suspended.
		8 sent to workhouse.
		4 fined.
		7 discharged.
		3 given hours in jail.
22	Arrested for stealing coal	22 fined.
2	Trespassing and carrying concealed weapons	1 fined.
		1 sent to jail.

Total arrested, 422; total punished, 234.

CHICAGO, BURLINGTON & QUINCY.

The record obtained from the Chicago, Burlington & Quincy relates only to trespassing on the lines east of the Missouri river. The management indicates that on account of the courts along its lines being unwilling to punish trespassers only a few arrests are made, and that it is only in aggravated cases that the court can be prevailed on to take any action.

Number Arrested.	Cause.	Disposition.
52	Trespassing on elevation	38 discharged.
		5 paroled.
		6 fined.
		1 fined $200 and given sentence.
		2 placed under $200 peace bond.
33	Trespassing	13 dismissed.
		20 fined.
2	Trespassing and carrying concealed weapons	2 fined $75 and cost—jailed.
6	Trespassing and drunk	6 fined.
1	Trespassing and throwing rocks	1 fined.
11	Disorderly conduct	9 fined.
		2 dismissed.
4	Riding top of train	2 fined.
		2 bound over.
1	Robbery	1 dismissed; insufficient evidence.
1	Uncoupling moving train	1 ten years in penitentiary.

Total arrested, 111; total punished, 43.

CHICAGO & WESTERN INDIANA AND BELT RAILWAY.

The Chicago & Western Indiana and the Belt Railway of Chicago have special officers to patrol their right of way and question all parties whom they find trespassing on it and unless they give satisfactory answers they are arrested.

Number Arrested.	Cause.	Disposition.
3	Trespassing on track	3 discharged.
2	Trespassing and grain sweeping	1 paroled.
		1 discharged.
160	Trespassing	95 discharged.
		38 paroled.
		21 fined.
		1 under bond.
		4 turned over to juvenile officer.
		1 sent to detention hospital.
1	Violating R. R. law	1 discharged.
2	Trespassing and flipping	1 fined.
		1 turned over to juvenile officer.
1	Trespassing and riding train	1 fined.
1	Trespassing and disorderly	1 discharged.
1	Violating R. R. law and trespassing	1 discharged.
3	Trespassing and stone throwing	3 sent home with warning.

Total arrested, 174; total punished, 28.

CHICAGO & NORTH WESTERN.

The data furnished by the Chicago & North Western relates only to arrests in Chicago territory. The police of the road believe that conditions have improved regarding the number of people found loitering on the elevations and are satisfied that if the municipal court judges would be a little more severe trespassing could be reduced to a minimum in a short time. "But so many youngsters are discharged with a warning and paroled to juvenile officers, which is only another way of letting them go, that their arrests do not have the effect that they otherwise would." In June, 1911, the North Western posted its lines with notices written in different languages, cautioning people against trespassing and stating the penalty for doing so, but these notices were torn down almost as fast as they could be put up and few of them now remain.

Number Arrested.	Cause.	Disposition.
4	Loitering on elevation	2 fined.
		2 discharged.
20	Trespassing on elevation	11 fined.
		4 discharged.
		5 paroled to juvenile officer.
5	Jumping trains on elevation	4 discharged.
		1 fined.
10	Stoning trains	2 discharged.
		8 taken to police station and released on promise of good behavior and to keep away from elevation.
3	Loitering and petty larceny	3 paroled.
1	Throwing coal off cars on elevation	1 paroled to father.
5	Being on elevation	1 fined.
		2 discharged.
		2 to juvenile officer.
3	Opening cars on elevation	2 discharged.
		1 to parental school.
17	Flipping on elevation	6 fined.
		7 discharged.
		4 paroled.
10	Coming on elevation to catch outgoing trains to steal rides	10 discharged.
13	Riding engines	5 fined.
		5 to juvenile officer.
		1 discharged.
		2 to juvenile court.
1	Stealing ride	1 discharged.
2	Riding on elevation	2 fined.
2	Riding pilot engine	2 discharged.
2	Flipping trains	2 discharged.
13	Stoning trains on elevation	All taken to station and taken in charge by juvenile officer and released on promise of good behavior.
20	Riding cars on elevation	13 paroled.
		5 fined.
		2 discharged.

Total arrested, 131; total punished, 34.

MICHIGAN CENTRAL.

An officer of the Michigan Central reports that at some points on that line, country and city officials are willing to prosecute and punish trespassers, while at other points they will not do so. He continues:

For example, the city officials of Toledo are at all times willing to handle a case of trespass where a man or boy is caught riding on the head end of a passenger train or interferes with our work in the yards, while at Detroit the police will not prosecute or punish a trespasser of any kind unless his case is aggravated by theft or drunkenness. We are guided in our actions by what we know the police will do. In Toledo if a man or boy is caught on the head end of a train stealing a ride he is arrested whether the train be freight or passenger. In Detroit we are compelled to simply watch our trains and drive the trespassers away. There are numerous tramps around Detroit who go to the yards to ride out on freight trains. We are compelled to watch these trains with the greatest of care, and often our men ride them out for several miles in an endeavor to get the trespassers off.

On account of the petty depredations committed by these tramps we are compelled to use every effort possible to keep them from the trains. I find in visiting the towns along the line that very few of them have a rockpile on which to work prisoners who are arrested for misdemeanors or trespassing, nor have they any arrangement whereby the prisoner can be made to work out his fine. In these towns it cannot be expected that they will punish prisoners for trespassing. As a rule all over the line we cannot do much but drive away the tramp or boy who attempts to ride on our trains or interfere with the work of switchmen in the yards.

Number Arrested.	Cause.	Disposition.
18	Riding trains	5 fined.
		8 jail sentence.
		3 fined and sent to jail.
		2 sentence suspended.
5	Loitering and making trouble for employees	1 fined.
		4 sent to jail for 10 days.
2	Wandering about freight yard at night with evident intention of stealing	2 fined.

Total arrested, 25; total punished, 23.

LAKE SHORE & MICHIGAN SOUTHERN.

An officer of the Lake Shore & Michigan Southern writes:

Whenever tramps, hard looking characters, or train riders are encountered in our yards they are driven off, and frequently placed under arrest. There are points, however, where it is useless to arrest trespassers on account of the authorities refusing to take action against such offenders. The reason given in most cases is that the municipalities do not care to be burdened with the expense of lodging vagrants and tramps, and action is seldom taken against them unless it is ascertained that they are able to pay a fine, in which case a small fine is generally imposed. Our policing of large yards is constant, and train riders are arrested wherever results can be obtained.

LAKE SHORE & MICHIGAN SOUTHERN.

Number Arrested.	Cause.	Disposition.
104	Train riding	37 jail sentence.
		41 fined.
		17 sentence suspended.
		5 discharged.
		2 sent to juvenile home.
		2 sent to detention home.
27	Unlawful intrusion	22 sentence suspended.
		1 jail sentence.
		1 fined.
		3 discharged.
3	Vagrancy	2 fined $10 and given 10 days on rock pile.
		1 jail sentence.
9	Trespassing	6 discharged.
		1 fined $11 and given 10 days in jail.
		1 sentence suspended.
		1 turned over to juvenile officer.
3	Malicious trespassing	3 fined.
1	Drunk and trespassing	1 fined $5.
2	Drunk and disorderly	2 fined $11 each.
3	Disorderly conduct	3 discharged.

Total arrested, 152; total punished, 94.

BALTIMORE & OHIO RAILROAD.

Number Arrested.	Cause.	Disposition.
1,465	Violation of railroad laws	430 jail sentence.
		146 workhouse sentence.
		8 reformatory sentence.
		232 fined.
		529 paroled.
		120 released unconditionally.

Total arrested, 1,465; total punished, 816.

CHICAGO GREAT WESTERN.

The record of arrests on the Chicago Great Western is stated by the officers of the road to be incomplete because no attempt has been made to keep it complete.

Number Arrested.	Cause.	Disposition.
2	Burglary and larceny	1 waiting next term of court.
		1 fined and sent to jail.
64	Drunks	19 fined.
		6 put to work on street.
		18 jail sentence.
		21 released.
19	Train riding	13 dismissed.
		3 fined.
		3 jail sentence.
23	Vagabonds or trespassers	22 put to work on street.
		1 released.
4	Loitering	1 jail sentence.
		2 discharged.
		1 fined.
2	Breaking and entering	2 released.
7	Trespassing	3 released.
		1 three days' labor.
		2 jail sentence.
		1 fined.

Total arrested, 121; total punished, 78.

BALTIMORE & OHIO CHICAGO TERMINAL.

The B. & O. Chicago Terminal made a report covering the months of March, April and July because in May and June its police officers were engaged in protecting its freight house on account of the strike of freight handlers in Chicago. It is the practice on this road to have the offender brought into court, where, it is stated, he is usually let off with a reprimand and warning. If a juvenile, he is ordinarily paroled to the juvenile officer of his district.

Number Arrested.	Cause.	Disposition.
137	Larceny	42 paroled.
		5 fined.
		2 sent to jail.
		84 paroled to juvenile officer.
		2 sent to reformatory.
		2 put in $500 bonds.
104	Trespassing	71 paroled.
		18 paroled in $200 bonds.
		2 paroled in $500 bonds.
		3 paroled to juvenile officer.
		4 fined.
		6 sent to house of correction.
23	Disorderly conduct	20 paroled.
		2 paroled in $500 bonds.
		1 sent to house of correction.
9	Violating railroad law	2 fined.
		7 paroled.
7	Malicious mischief	3 pending in criminal court.
		1 fined.
		2 paroled.
		1 sent to house of correction, 23 days.
14	R. S. P.	14 nonsuited.
7	Burglary	2 fined.
		1 sent to jail for 6 months.
		3 sent to house of correction, 60 days.
		1 nonsuited.
1	Assault and battery	1 paroled.

Total arrested, 302; total punished, 30.

ERIE RAILROAD.

The following table shows the diligence with which the police of the Erie follow up cases of trespassing:

Number Arrested.	Cause.	Disposition.
530	Train riding	57 fined.
		219 sentence suspended.
		70 bought tickets and were released.
		71 discharged.
		68 sent to jail.
		2 sent to detention home.
		31 ordered out of town.
		2 ordered out of town account lock-up being full.
		3 hard labor on streets, 5 days.
		2 paroled.
		4 sent to workhouse.
		1 turned over to charity society; ran away and caught train riding again and turned over to juvenile court.
120	Trespassing	24 fined.
		25 sentence suspended.
		23 sent to jail.
		11 ordered out of town
		24 discharged.
		2 sent home to parents.
		2 sent to reformatory.
		1 sent home with parents.
		3 paroled.
		3 sent to workhouse.
		2 put in charge of probation officer.
22	Trespassing and malicious mischief	6 sentence suspended.
		5 turned over to juvenile officer.
		11 fined.
4	Trespass and breaking into gum machine	4 discharged.
4	Trespass and breaking off lock on tool house	3 paroled.
		1 sent to parents.
1	Trespass and meddling with railroad property	1 held for grand jury, $500 bail.
2	Trespass and cutting air hose on cars	2 held for action of grand jury.
9	Trespass and vagrancy	5 sentence suspended.
		4 sent to jail.
14	Trespass and coal theft	7 fined.
		5 paroled.
		1 turned over to probation officer.
		1 turned over to juvenile court.
2	Trespass and theft of iron	2 paroled.
4	Vagrancy	2 sent to jail.
		2 sentence suspended.
8	Violating track elevation ordinance	3 fined.
		5 discharged.
6	Begging at station	3 discharged.
		2 sent to workhouse.
		1 ordered out of town.

Total arrested, 726; total punished, 215.

NEW YORK, CHICAGO & ST. LOUIS.

This road has its police force ride trains and watch them through the principal towns, arresting trespassers, or, when practicable, compelling them to buy tickets. The data supplied by it is for the months of May, June and July, 1912.

Number Arrested.	Disposition.	
473	Number purchasing tickets	79
	Number fined or imprisoned	225
	Number discharged	57
	Number cases pending	4
	Number paroled	106
	Number escaped from jail	2

Total arrested, 473; total punished, 227.

ROCK ISLAND LINES.

The information for these lines relates only to trespassers arrested on the First district. The management explains that the fact that all but one arrest was followed by punishment was due to the fact that the Rock Island's police exercise much care to arrest only those they are pretty sure can be convicted.

Number Arrested.	Cause.	Disposition.
12	Train riding	5 fined.
		6 jail sentence.
		1 paroled.
14	Trespassing	12 fined.
		2 jail sentence.
8	Disorderly conduct	8 fined.
2	Malicious mischief	2 one year in jail.
1	Robbery	1 still in jail.
1	Attempted robbery	1 sent to reform school.

Total arrested, 38; total punished, 37.

GRAND TRUNK.

An officer of the Grand Trunk writes:

We have special constables in our most important terminals to prevent trespassing as well as theft. Trainmen protect their trains from trespassers, and we also employ special agents for investigating thefts, frauds and assisting generally in the protection of property, etc. More assistance from prosecuting attorneys and police justices, particularly in Michigan, in convicting trespassers, would result in a gratifying reduction in the

tramp element, which is a serious menace; and the need is a trespassers' act framed sufficiently drastic to insure its effectiveness.

Number Arrested.	Cause.	Disposition.
182	Trespassing	3 suspended sentence.
		52 fined.
		44 sent to jail.
		79 discharged.
		2 sent to children's aid society.
		2 sent to asylum.
4	Carrying concealed weapons	4 sent to jail.
20	Disorderly conduct	13 discharged.
		2 fined.
		5 not given.
22	Stealing rides	20 sent to jail.
		2 discharged.
10	Suspicion	4 sent to jail.
		6 discharged.
2	Throwing stones	2 discharged.

Total arrested, 240; total punished, 130.

NORTHERN PACIFIC.

The figures for the Northern Pacific cover only the lines east of Paradise. The policing method followed is to have watchmen at terminal points who make every effort to keep trespassers off trains. The laws against trespassing are not uniform in the different states through which the road runs, and in some states it is necessary to guard against arresting trespassers who could not be prosecuted.

Number Arrested.	Cause.	Disposition.
6	Vagrancy	2 fined.
		1 63 days on rock pile.
		3 10 days on chain gang.
27	Trespassing	6 fined.
		5 sent to jail.
		13 ordered to leave town.
		1 sentence suspended.
		2 10 days on street.

Total arrested, 33; total punished, 19.

ATCHISON, TOPEKA & SANTA FE.

At its division and district terminals the Santa Fe has special officers permanently stationed who are in uniform at passenger train time and who police the station premises and yards. It also has train riders, who ride freight trains and look out for persons stealing rides. The road does not police its lines specifically to prevent trespassing, and ordinarily trespassers are arrested only when their actions arouse suspicion as to their intentions and when the officers are reasonably sure of obtaining convictions carrying jail sentences or fines.

EASTERN LINES.

Number Arrested.	Cause.	Disposition.
41	Trespassing	1 discharged.
		1 nolle prossed.
		16 fined.
		16 sent to jail.
		3 given hours.
		4 paroled.

Total arrested, 41; total punished, 35.

WESTERN LINES.

Number Arrested.	Cause.	Disposition.
2	Petit larceny	2 fined.
72	Riding trains	25 ordered out of town.
		15 sent to jail.
		6 fined.
		21 discharged.
		1 probation.
		4 $20 or 20 days.
36	Vagrancy	21 ordered out of town.
		15 fined.
1	Disorderly conduct	1 sent to jail.

Total arrested, 111; total punished, 43.

COAST LINES.

Number Arrested.	Cause.	Disposition.
68	Evading fare	3 released.
		1 fined.
		28 ordered out of town.
		20 jail sentence.
		12 discharged.
		1 probation.
		3 made to pay fare.
2	Petit larceny	2 fined.
2	Vagrancy	1 ordered out of town.
		1 jail sentence.
1	Loafing	1 discharged.
1	Fighting	1 jail sentence.
20	Sleeping in cars	20 ordered out of town.
1	Disturbing peace	1 jail sentence.

Total arrested, 95; total punished, 26.
Grand total arrested, 247; grand total punished, 104.

EXISTING LAWS REGARDING TRESPASSING.

The continuance of chronic trespassing and of the chronic slaughtering due to it are mainly due, as has been said, to the fact that in most states and municipalities the laws do not specifically prohibit trespassing on railway property, or that they are not enforced. In most of the states there are statutes prohibiting tampering with switches, placing obstructions on the tracks, stealing rides on trains, etc.; but the great need is legislation specifically prohibiting trespassing in any form.

Although the risk involved in ordinary trespassing, and its results in many forms of criminality and in the killing of 5,000 people a year, are well known, in a large majority of states there are no specific statutes dealing with the subject. There are enough of them, however, to show that where intelligent consideration has been given to the matter the need for such legislation has been appreciated. In New York all persons, except those connected with or employed upon a railroad, are prohibited from walking upon or along its tracks, except where they are laid across or along streets or highways. In Wisconsin it is declared to be unlawful for any person, except an employee, to walk along railway tracks, unless they are laid along public roads or streets, but no penalty is provided for violating the statute. In Virginia persons are prohibited from being on a track within one hundred yards of an approaching train otherwise than in passing over the railway at a public or private crossing. In Missouri it is provided that any person who is injured while walking without right on a railway track shall be deemed to have committed a trespass in any action brought by him on account of such injury, but the courts of Missouri have practically nullified this statute and there is no specific prohibition of mere trespassing. In Indiana any person who is unlawfully on, or is about to unlawfully enter on, the property of a railway shall be notified to depart by the company's agent, and if he shall refuse to do so, shall be guilty of a misdemeanor and on conviction shall forfeit not less than $5 nor more than $50. This law is very defective because of the provision that notice must be given to the person before his trespassing can be punished.

In New Hampshire it is provided that "if any person shall without right enter upon or remain in any right-of-way, track, yard, station ground, bridge, depot or other building of any railway when notice has been posted forbidding such trespassing, he may be fined not exceeding $20, and no right to enter or be upon any railroad track shall be implied from custom or use, however long continued." It is further provided that if any person shall be injured while violating this act, neither he nor his executors or administrators shall have any cause of action against the railroad company for damages arising from such injury unless the injury is occasioned by the willful or gross negligence of the railroad or its employees. In Maine it is provided that no railroad corporation shall be liable for the death of a person walking or being on its road contrary to the law or to its valid rules and regulations. It is further provided that whoever without right trespasses on a railway track or other property shall forfeit not less than $5 nor more than $20. Railways are required to keep the section containing this latter provision posted in a conspicuous place in every passenger station, and for neglect thereof may be fined $100. The New Jersey law prohibits any person but an employee from walking along tracks except when they are laid on a public highway; and any person who is injured while violating this provision cannot recover damages. Massachusetts provides that whoever without right knowingly stands or walks on a railroad track shall forfeit not less than $5 nor more than $50, and the Rhode Island law is similar.

THE SITUATION A STRIKING COMMENTARY ON GOVERNMENT REGULATION.

The foregoing summarizes the provisions of all the state laws that can be found that deal with the specific subject of railway trespassing. Furthermore, the laws already existing are not enforced as the conditions demand. It is a striking commentary on the policy of regulation of railways heretofore followed that numerous legislatures have passed laws regulating the hours of service of railway employees, fixing the number of men that there

must be in train crews, requiring high power headlights, providing for inspection of locomotive boilers, etc., all of which provisions together are adapted to prevent only an extremely small part of the fatal railway accidents, while in only a very small number of states have there been passed laws to remove the cause of over 50 per cent. of all fatalities on railways.

Congress has passed several laws to promote safety on railways, and it has been suggested that it should legislate regarding trespassing. Any authority Congress has over the subject must be derived from the constitutional provision empowering it to regulate interstate commerce. Lawyers who have considered the subject differ as to the power of Congress in the premises. Some doubt if a federal trespassing law would be valid; others question if it would be desirable; others believe that it would be a constitutional and wholesome regulation of interstate commerce.

The consensus of legal opinion is that the matter should be dealt with by the states in the first instance, at least. There is no doubt as to the power, and it would seem there can be no question as to the duty, of the state legislators to act. A very short and simple statute, if properly enforced, would be adequate. Such a statute should make it unlawful for any person to trespass on any railway track, right-of-way or station grounds, or to trespass by getting on or off, or riding on any railway train, car or engine; and would provide for fines or imprisonment, or both, for every offense.

FOURTEEN KILLED DAILY—AND NOTHING DONE!

Fourteen people were killed yesterday while trespassing; fourteen will be killed today; fourteen will be killed tomorrow—if the record of recent years is being and shall be maintained. It is not often that as many as fourteen passengers are killed in a wreck; but every bad wreck causes numerous investigations and reports, often resulting in orders by commissions or legislation. The greatest number of passengers ever killed in a single year from all causes was in 1907, when they numbered 610; and even in that year the number of trespassers killed—5,612—was over nine times as great as the number of passengers killed. In 1911, the last year for which we have complete statistics, the number of passengers killed was only 356 and the number of trespassers killed 5,284, or fifteen times as great. And yet newspapers agitate, commissions issue orders and lawmakers legislate to reduce accidents to passengers, and almost no one in a position of public authority does anything to reduce the slaughter of trespassers. The number of employees killed on railways is vastly too great, but it is not nearly as large as the number of trespassers killed. During the last ten years the number of employees killed has been about 33,000 and the number of trespassers killed has been about 52,000. And yet, while lawmakers bow before the legislative representatives of the railway brotherhoods and pass almost any kind of legislation for which they ask, whether really in the interest of safety or not, they do almost nothing to stop the killing of trespassers.

There will be forty-one legislatures in session this winter. Isn't it about time that they should do something about this great American crime of railway trespassing with its terrible results? And after the legislatures have acted—if they do—what are other public officials going to do about the matter?

Swiss Railway Employees.—There are employed on Swiss railways 42,000 persons, 35,200 of whom are with the state lines and 6,800 on private roads. This does not include the tramways or funiculars, the majority of which are owned by municipalities or Cantons.

Rosario-Mendoza Line, Argentina.—The financing of the first 175 miles of the line from Rosario to Mendoza has been arranged by the original holders of the concession with the Banco Frances del Rio de la Plata. The bank will issue stock and bonds to cover an estimated expenditure of $3,000,000. The cost of the entire line is calculated at about $25,000,000. The national congress has approved the construction of numerous branches from the line authorized by the original concession.

THE ANTHRACITE CONSPIRACY CASE.

The Supreme Court of the United States has dismissed the general charge of conspiracy against the Reading and other railroads involved in the anthracite trust suit, but sustained the charges of the government in minor respects by declaring the 65 per cent. contracts illegal and upholding the decision of the lower court in dissolving the Temple Iron Co. The Supreme Court holds that the allegation of a general pooling arrangement between the anthracite railroads to control and apportion the coal tonnage in the anthracite fields to the seaboard has not been proved.

The court holds that "the general combination alleged by the government to exist between the defendant roads for total tonnage to the seaboard by an agreement in the nature of a pooling arrangement has not been established; therefore, the relief sought by the government upon the assumption of such combinations is denied.

"The court finds, however, that the principal defendant did combine for the purpose of shutting out from the anthracite field the projected independent line of railroad, the New York, Wyoming & Western Railroad, and to accomplish this purpose it is found that the stock of the Temple Iron Co. and of the Simpson & Watkins collieries was acquired for the purpose of and with the intent not of normally and lawfully developing trade, but of restraining interstate commerce and competition in transportation which would have presumably come about through the construction and operation of a competing line between the mines and tidewater.

"The court holds that certain contracts made with producers covering between 20 per cent. and 25 per cent. of the annual supply of coal, known as the 65 per cent. contracts, by which such independent producers bound themselves to deliver the output of their mines, or any other mines which they might acquire, to the railroad companies for 65 per cent. of the average market price at tide water, were also void, because in violation of the anti-trust act, as abnormal and illegal restraints upon interstate commerce."

The court reiterates the declaration of the Standard Oil case that the act of Congress does not "forbid or restrain the power to make normal and usual contracts to further trade by resorting to all normal methods, whether by agreements or otherwise, to accomplish such purpose, nevertheless it holds that the acts which it finds in this case to be illegal," the Temple Iron and 65 per cent. contracts, were not within such class, but on the contrary were abnormal in their character and directly tended to and were intended to illegally restrain trade and commerce, and therefore came within the statute as illustrated by the ruling in St. Louis Terminal Association and Swift & Co. vs. United States.

In disposing of the case against the government as to the main combination charged and in favor of the government as to the Temple Iron and 65 per cent. contracts, certain minor contracts claimed to be in violation of the act are considered and disposed of in substance by holding that under the pleadings they may not be considered.

The decree of the court below is modified as to the 65 per cent. contracts and the court below is directed to cancel them.

The decree of the court below as to the Temple Iron Company combination is in all respects affirmed.

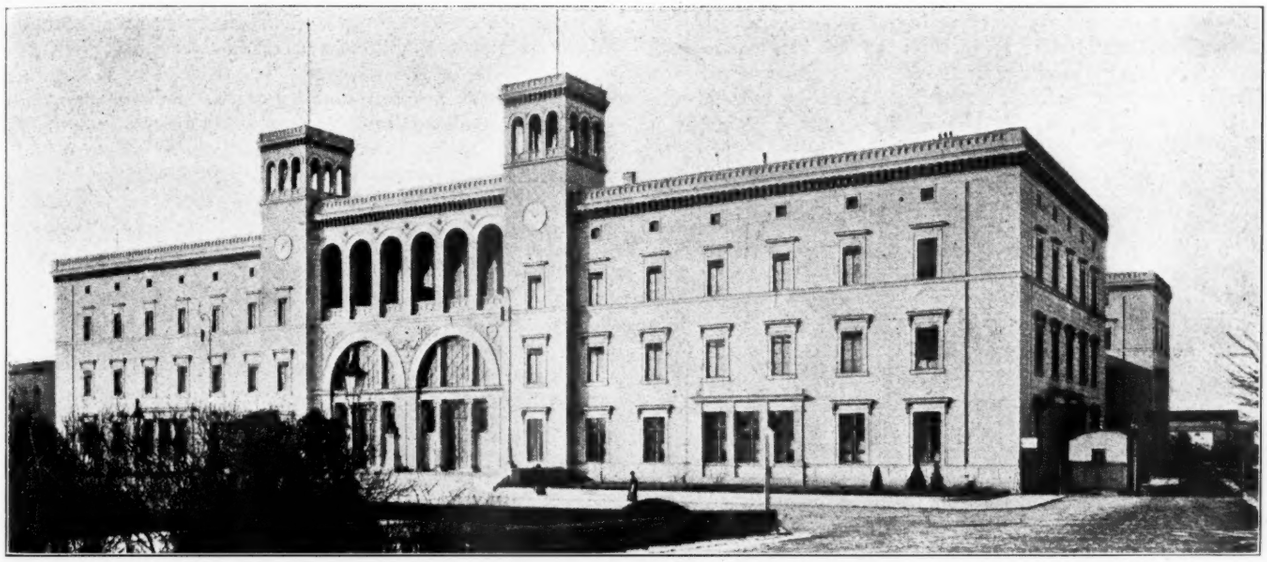
Electric Railway Construction in Switzerland.—Electric railway building has also been active during the past few years, this being particularly noticeable in the Lugano district. The lines completed and put into operation in the Canton of Tessin within the past twelve months are: Locarno-Bignasco, 17 miles; Bellinzona-Mesocco, 16 miles; Biasca-Acquarossa, 9 miles; Capolago-Chiasso, 8 miles; Lugano-Ponte Tresa, 8 miles; Lugano-Tesserete, 5 miles; Lugano-Cardo-Dino, 5 miles.

A VISIT TO THE RAILWAY MUSEUM IN BERLIN.

Working Models of Shops; Historical and Modern Examples of Railway Apparatus; Broken Rails and Wheels on Exhibition.

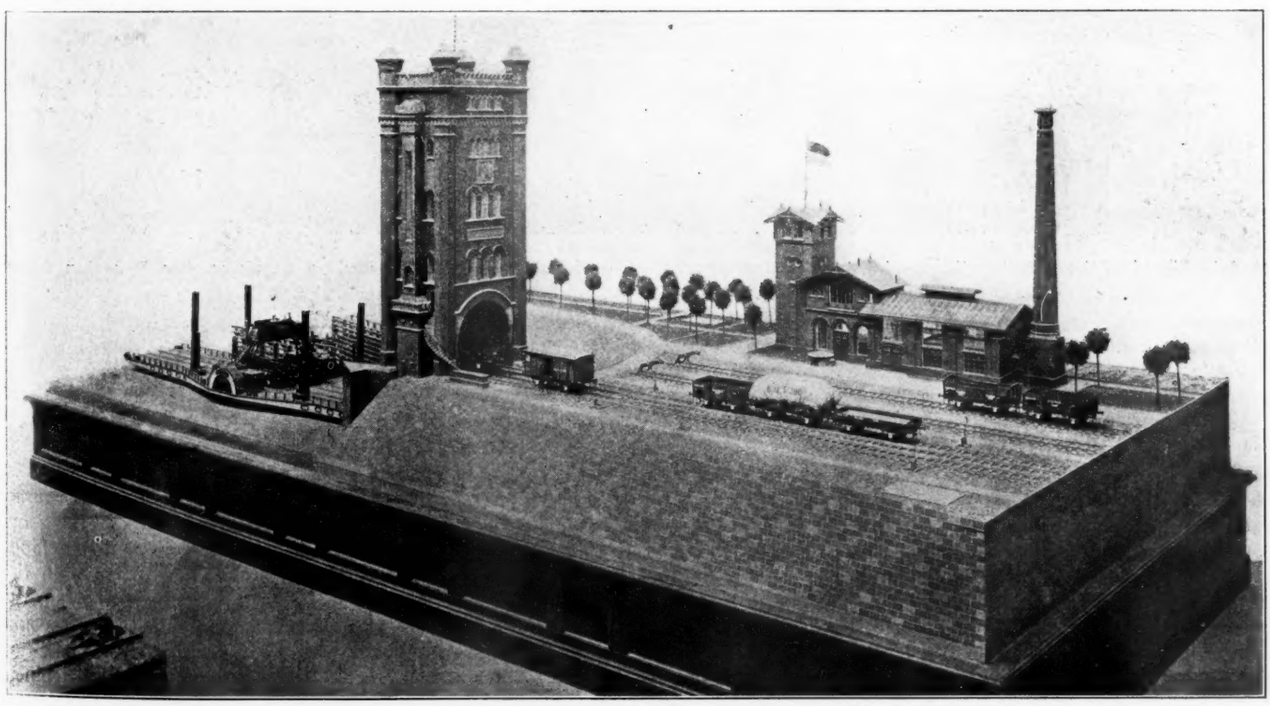
By Henry W. Jacobs.

In discussing railroad practices with several of the officials of the Prussian State Railroad System in Berlin, I was invited to spend a day in the technical and historical railway museum, for which a large building has been erected in a convenient location in Berlin.



General View of the Railway Museum in Berlin.

Before proceeding with an account of this most instructive visit, I should like to state that, while in railroad operations, as well as in other industrial organizations, we in America have much of immediate and practical benefit to learn from the German methods of training and thoroughness of investigation, there are many machine tools in European manufacturing establishments that had been imported from America, and our country undoubtedly ranks very high when it comes to standardization of production and production machinery. One of the chief engineers of one of the largest manufacturing concerns stated that nowhere could his company find the equal of American automatic machinery. The feeling persists, however, that we are frequently apt to develop a new machine, design, or device on an extensive scale without being sufficiently sure either of the correctness of the principles on which the departure from exist-



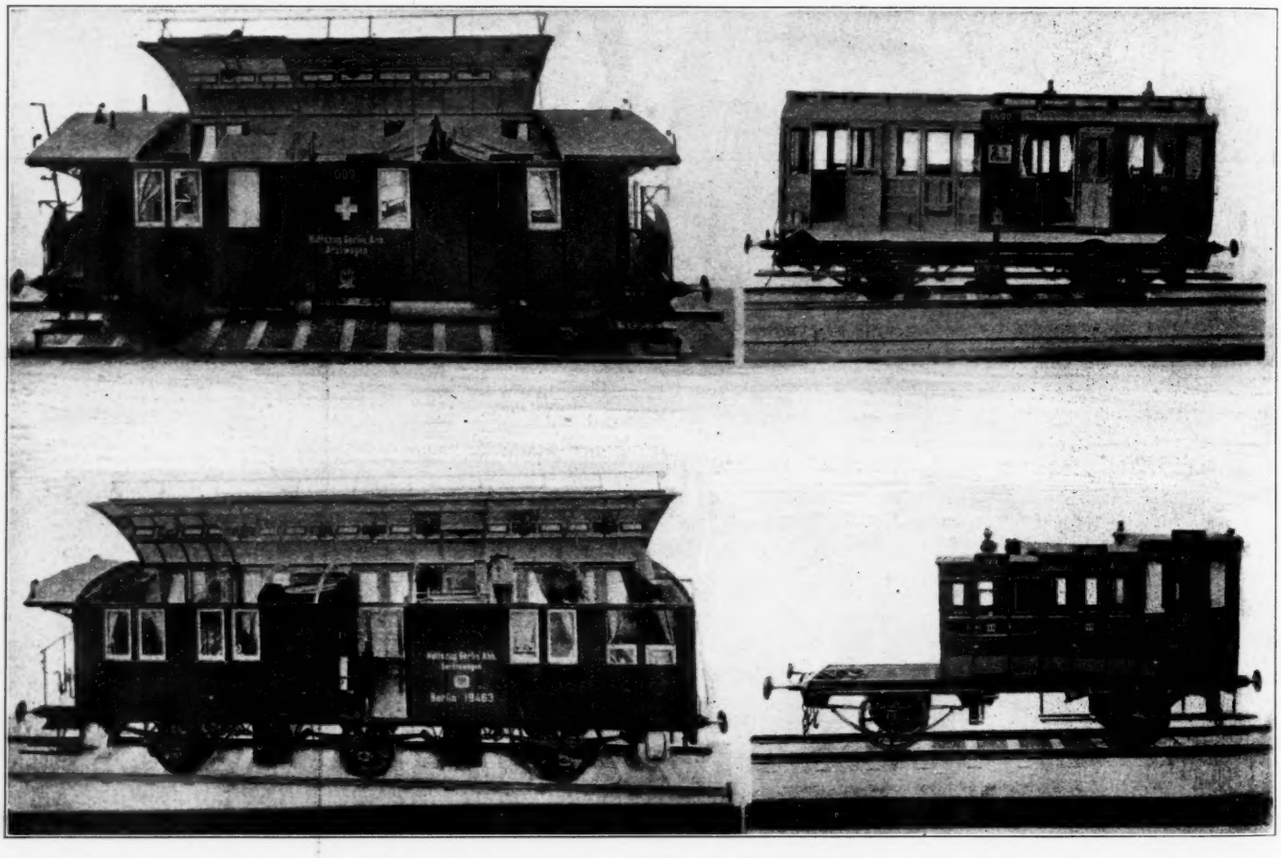
One of the Models in the Railway Museum at Berlin.

ing practice is based, or of the care with which details have been worked out practically. The German procedure after the discovery or invention of a new idea, or change from existing practice, is first to examine the new practice in the light of all of its theoretical bearings, working out the apparent limitations of the new idea in all directions. This theoretical study is followed by an equally exhaustive series of test constructions which are thoroughly tried out under laboratory conditions with the most painstaking record of performance. Only as a result of this thorough and intense study on the part of the best trained minds is an application made of the new idea on a practical scale in collaboration with men of sound practical experience.

Probably no more striking example of this German method of thoroughness and of their appreciation of the value of adequate instruction can be found than in the official railway museum. Here is located as complete a collection as exists, even in part, in all the rest of the world, showing the historical development of all parts of the railway, of its organization, personnel, and benevolent institutions, as well as of its physical attributes, such as track and track details, cars, locomotives, shops, and stations.

Besides these historical exhibits, which are placed in such an order that one can follow the gradual development from the earliest forms to the most modern, there is also a most complete collection of everything representing present-day practice. The exhibit includes a large number of examples of rail, axle, and wheel breakages, boiler explosions, and other causes of accident or failure in railroad operation, constituting a permanent and growing study of cause and effect, so that the future may learn from the past what mistakes to avoid.

Very complete models of the best locomotive and car-repair shops are on exhibition. Each of these models covered a considerable area and was complete in showing the materials and design of the building structure, of the shop layout, of the method of routing the work through the shop, showing also the new machines, such as lathes, planers and cranes in the shop. Many of the models could be set in operation. For instance, a complete operation of putting a wheel in the wheel lathe, turning it and then handling it again with the crane would work itself out automatically in this model, so that those not familiar with shop practice, or others, could come to this museum and see in miniature the complete operation. Ocular and physical demonstration on a three-dimension scale was here substituted for a mere written or printed description, or even photographic representation, as a method of instruction which would leave a more complete and lasting impression. As another example, a cross-section of a modern railway storehouse was shown, with all of the materials, in miniature, in their allotted places, and little puppets representing the store clerks receiving and filling the orders from the shop. Of course, a bird's-eye view of such a storehouse, shop, terminal station, yard, or engine-house, many of them in actual movement, is much more readily grasped in a short time than it would be in a trip of several hours over the full-size actual plant.



Models Showing the Construction and Interior Arrangement of Both Old and Modern Rolling Stock on the Prussian State Railways. These Models Are Complete in Every Detail.

The instructive nature of these models did not end with those who might see them in the museum, but fulfilled a similar function when the models themselves were being made. The making of the models is very largely carried out by the apprentices in the shops, who from the building of the models must, of course, learn much of the nature of the subject they are working on. A better method of instruction in the most careful use of tools, appreciation of niceties of design, stimulation of pride in the workmanship of the finished product, and instruction in the principles of the various aspects of railroad operation could hardly be devised for an apprentice.

Some of the models, both of locomotives and of machines, were supplied by the big manufacturing firms who engage in these branches of business, and served as an advertisement of the excellences of their products as well as being most useful to

the student of the existing types of machines and equipment.

Similar museums are maintained at Nuremberg and Munich in Bavaria, the great museum at Berlin representing only the Pressian State Railway Administration, the largest railway system in the world. It is well known that in the past twenty years Germany has made tremendous strides industrially, ranking today among the leading manufacturing and commercial nations. This enviable position has been won through the natural frugality and the careful, saving disposition of the German, applying in his manufacturing industries the principle of converting wastes into profitable by-products. The German is not at all given to extravagant and useless show, and these museums are not exhibits on which large sums have been spent in the mere pride of past achievement. They have been instituted with the idea that their instructive character would have a practical effect on the understanding and esprit-de-corps of all classes of railway employees and officials, far outweighing the comparatively trifling expenditure of money for this purpose.

This practice, for instance, would seem to furnish an object lesson to American railway men and railway supply manufacturers, whereby, through co-operation, a similarly instructive, permanent exhibit, of value alike to the railway men and the manufacturers, could be established. Of course, we already have had for many years our master mechanics and maintenance of way convention exhibits where the latest developments have been shown in full size. The expense not only of the preparation of these exhibition devices but of their shipment to the place of exhibit and back again, and the number of demonstrators required to explain the advantages of the new development, has amounted to a considerable amount of money annually, and, as stated before, these full size objects are not always so readily grasped, nor can the ground required to show them be covered so readily as would be the case if small but carefully made models were in most cases used. This is particularly true in the case of big machines, cars, cranes, building fixtures, etc. Small objects like tie plates, metallic packing for locomotives, can, of course, be shown usually in full size. To some extent an effort is being made to create a permanent railway exhibit in the Karpen building, in Chicago, but the railroads have no official connection with this enterprise and it has a purely commercial character.

THE CANADIAN PLAN FOR PREVENTING STRIKES.*

By HON. W. L. MACKENZIE,
Former Canadian Minister of Labor.

The Canadian Industrial Disputes Investigation Act, enacted in 1907, was conceived primarily to protect the public against a repetition of a fuel famine caused by a strike of coal miners. In providing, however, machinery at the expense of the State to aid in the prevention of strikes and lockouts, the statute was made to include mines, railways and street railways, steamships, telegraph and telephone lines, gas, electric light, water and power works.

Before a strike or lockout can take place the parties aggrieved must apply to the government for a board of investigation, each party to elect a representative and these two a chairman, or, failing their agreement, the government to appoint a chairman.

From time to time in Canada it has been proposed that instead of a special board for each dispute there should be a permanent board, or a board permanent in part, but having for every case a representative of each party—thus always giving a majority of neutrals. No one board could handle all the cases which would arise—an objection much greater in a country as large as the United States, and especially if the application of the act were widely extended. Formalities and rigid precedents, so fatal to conciliation in industrial disputes, are more difficult to avoid with permanent than temporary boards. The neutral majority also has found less favor than the board of three, where each party is regarded as having two representatives—its own appointee and the chairman to whom it has agreed.

The board is expected to try conciliation, and, that failing a settlement, to proceed formally. Its findings, failing a settlement, become the official utterance through which public opinion is shaped and brought to bear. If the parties reject the finding they may strike or lockout. In other words, compulsory arbitration as understood in Australasia was not viewed with favor, and was not made a part of the Canadian plan. What we have is compulsory investigation and compulsory publicity. In practice no compulsion has proved necessary, except that of public opinion.

In the five and a half years there have been 132 applications for boards of which 53 were in railways, 40 in coal mining, and the rest in several other occupations. Out of the 132, strikes were averted in all save 15. There have been only four railway strikes. The recent Canadian Pacific dispute arose among a class of employees to whom the Minister of Labor adjudicated the act as impracticable. Prior to the act not a year passed without a street railway strike; since the act, there has been just one in all Canada. The commercial telegraphers along with the railway telegraphers have had strikes averted. Hence, Canada has enjoyed for nearly six years all but complete immunity from lockouts and strikes on all her important agencies of transportation and communication.

To the public the act has been of real service and is appreciated. The railway companies, which at the outset were inclined to view with suspicion, if not alarm, the wide power of a board to search their records and question their officials, now without exception endorse it. The following railway labor organizations, through their legislative representatives, in letters addressed to me while certain amendments adopted in 1910 were under way, declared that with these changes this legislation would be entirely satisfactory to them: Brotherhoods of Locomotive Engineers, Locomotive Firemen and Enginemen, Railway Trainmen, Railroad Telegraphers, and Maintenance of Way Employees. There has been request for Parliament to extend the scope of the act to cover all industries.

In the United States the only national legislation with which the Canadian Act may be compared is the Erdman Act, applicable to railway employees engaged in train service. Commissioner of Labor Neill this year reported that since 1906 "there has been no case of a serious strike or of danger of a serious strike on the part of those classes of employees to whom this law is made applicable in which the provisions of this law have not been invoked," and that with one exception there has been no case in which mediation was invoked and accepted before the actual beginning of a strike in which an amicable adjustment has not been brought about.

In comparing the Erdman Act with the Canadian Act it will be noticed that the latter is compulsory investigation. The Erdman Act cannot now be invoked unless both parties join in the application. In Canada the investigation must be held even if neither party applies. Under the Erdman Act publicity takes place, if at all, after the strike has begun or perhaps has exhausted its strength. In Canada publicity takes place before the strike can begin. The Canadian Act embraces not only employees in train service but all railway employees as well as all industries in the nature of public utilities.

*Abstract of an address delivered at the annual dinner of the Railway Business Association, Thursday evening, December 19, 1912.

MOTOR CARS FOR AUSTRALIA.—It is the intention of the Australian minister for home affairs to purchase two motor cars for use on the transcontinental line. The back of the front seat and the cushions in each car are to be so arranged as to permit of their being folded back, in order that the cars may be used for sleeping accommodation. An indication that the cars are intended to be used in rough work is that a fire extinguisher will be fitted to the footboard, and a canopy that will completely envelop the car will be provided.

THE COUNTRY'S NEED OF GREATER RAILROAD FACILITIES.*

Increase of Business and Congested Terminals on the Railways of the United States; Need of Larger Terminals.

By James J. Hill.

The subject of national transportation is many-sided. One aspect of it takes precedence in one community or in the opinion of one interest, while for others some different phase ranks all the rest. But every interest and every community should understand that the main need today of transportation and of the many activities connected with and dependent upon it is an increase of terminal facilities. It is no exaggeration to say that the commerce of the country, its manufacturing and agricultural industry, its prosperity as a whole and the welfare of every man in it who engages in any gainful occupation can escape threatened disaster only by such additions to and enlargements of existing terminals at our great central markets and our principal points of export as will relieve the congestion which now paralyzes traffic when any unusual demand is made upon them. Our natural material growth will make this their chronic condition unless quick action is taken.

If you increase the size of a bottle without enlarging the neck, more time and work are required to fill and empty it. That is what has happened to the transportation business. In 1907 traffic was blocked on nearly all the principal eastern railway lines. It took months to convey an ordinary shipment of goods from one domestic market to another. The deadlock was broken partly by a panic that lessened the volume of business and partly by the efforts of railway managements to add, by increased efficiency, to the moving power of facilities at command. We neither anticipate nor desire perpetual business depression. While the limits of efficiency have not been reached, we know that it cannot be made to cover the demands of our growth in population and production. The records of any large city will prove this. The tonnage of the Pittsburgh district, for example, by railroads alone, grew from 64,125,000 to 152,000,000 in the ten years between 1901 and 1911. It is both practical and patriotic to ask what is to be done.

First, let us examine the table below, compiled from the reports of the Interstate Commerce Commission, showing the recent growth of the transportation business in the United States:

	Increases Per Cent.		
	1895 to 1905.	1905 to 1910.	1909 to 1910.
Mileage	21	11	1.5
Locomotives	35	22	3
Passenger cars	23	16	3.3
Freight service cars	45	23	3
Passenger mileage	95	36	11.
Freight ton mileage	118	37	16.6

Business is beginning to feel the swell of a revival. The freight ton mileage of the country was less by seventeen and a half billions in 1909 than in 1907, and very little more than in 1906. Contrast this with the growth of the single year between 1909 and 1910. The freight ton mileage grew in that year eleven times as fast as trackage, and five times as fast as equipment. This ratio will be subject to increase rather than decrease. It will be much greater in this year of large crops and added tonnage. If any manufacturer were confronted with such conditions, it would be clear to him that he must either refuse business or more than double his plant. The railroad cannot refuse business. If it could do so legally, that policy would still mean national panic and individual ruin. It must enlarge its plant. Just what this means in the expenditure of billions of dollars on new track and rolling stock I demonstrated more than five years ago, and the facts have now been accepted by all authorities. But even the existing plant cannot be worked to its capacity without larger terminals. Hence the supreme importance at the very outset of this factor of the transportation problem.

This matter is vital not only to the railroads, but to every business man. It is the immediate concern of every large city. Cities can grow, they can escape decline, only as the movement of business between and through them is kept free. When the people find that their business cannot be handled, they must either move away or cease producing and consuming. They will decentralize their traffic, so far as that can be done; and the inability of the railroads to prevent this, by reason of conditions imposed on them from without, will work injury to all the great markets which have arisen through the free play of economic forces and the wise judgment of the builders of our prosperity.

Interest in this question should be not local only, but national. A railroad terminal performs the same function as a harbor. It is actually the largest and most valuable harbor used by the nation's commerce. Probably no greater volume of rail and water traffic is transferred in any city anywhere than in Duluth-Superior. On the land side the whole of this is mainly carried by three railroads. It is received, transferred and discharged without congestion in the busiest seasons and with expedition; the terminals there have been specially created for the work.

Whenever we have a big crop or a general revival of business, the country hears most of the danger of a car shortage. The public assumes that if enough cars are provided they can be moved on schedule time from point of origin to destination, wherever these may be. This is not the real trouble. What is really needed is the greater movement of cars. The average movement of a freight car is about 24 miles, or two hours, per day. Delays in loading and unloading by shippers are partly responsible, but much of the lost time is consumed in getting into, out of or through terminal points where there is not room to handle the cars. More cars intensify instead of reducing the trouble. No other business could endure the loss of the use of its machine plant for twenty-two hours out of the twenty-four. One thousand cars will cover nearly eight miles of track. Each car must be switched, loaded or unloaded, or all three. This multiplies the trackage requirement.

A thousand cars are a flea bite compared with the daily movement in the busy season. The railroads of the United States carried 1,849,900,101 tons of revenue freight in 1910. At the average load of 21.5 tons per car, it would take 86,041,865 cars to move it. Nearly all of these pass through some large terminal, most of them several times in the year. There are about thirty important traffic centers; and if the total movement were divided equally between them, supposing each car to pass through but one market, and that only once a year, 7,858 cars would have to pass through each terminal every day in the year. Five thousand cars a day are enough to create a blockade in many of the large terminals of the country. Our worst troubles have come not from insufficient rolling stock or lack of efficiency in handling it, but from congested terminals. There is but one possible remedy—enlarged terminals. The main question back of that is financial.

The two obstacles to be overcome in this readjustment of the transportation agency to the growing needs of the country are the physical difficulty and the cost. The railroads could not have foreseen and guarded against this need thirty or forty years ago. They could not then know where the greatest markets were to grow. They could not tell in what portion of any city it would be most convenient to have railroad yards placed a generation later. Upon the railroads rests the responsibility of performing the work now to be done. Will they be left free to attempt it

*Abstract of an address delivered last night before the Railway Business Association at the annual dinner.

under such conditions as will make the performance of it a feasible thing and not a miracle?

Large sums of money must be raised. What security can the railroads offer for such a loan? Already, merely for constructing and operating their existing machine, many of them have not only pledged their credit to the limit but have absorbed a large share of their surplus earnings that in other countries would have been paid out in dividends. The ability of the Pennsylvania system to handle its big business is due in no small degree to its past policy of diverting profits, legally the property of the stockholders, to the construction of betterments. There is not a well-managed railway of any size in the country of which the same is not true to some extent. And, with the increase of their expenses and the limitation of their income by public authority, there is coming to be little or no surplus revenue that may be so employed. Net income, not gross, is the index of prosperity and the foundation of credit. The progressive decline of net earnings per mile under the existing policy of rate regulation is assured.

The properties of many systems are already encumbered to the limit of credit and solvency. Securities have been consolidated, equipment trusts have placed what are practically chattel mortgages on rolling stock, and money cannot be raised except for a short term and at high rates. The railroads can pay money only as they are permitted to earn it. In the last resort it is up to the people to say whether or not these terminals and other facilities shall be supplied; just as it is up to them to suffer the severest of the consequences if they are not.

"Why are the railways not now in a position to borrow the money and build the terminals at once?" "What have the railways done to entitle them to confidence, to relief and to a more fair and generous treatment by the public?" Each of these questions can be answered by an examination of facts officially vouched for.

The average freight rate per ton per mile received by the railroads of the United States fell from 9.27 mills in 1890 to 7.53 mills in 1910. This is partly the effect of legislative regulations and the orders of public commissions, and partly due to voluntary reductions made possible by increased efficiency and increase in the density of traffic. On the whole, railroad rates in the United States are the lowest in the world. But they cannot continue to grow less forever.

Rates must be such as will bring in, above operating expenses, a reasonable return on the investment as measured by the value of the property. So much the courts will uphold. But that is not enough, if the railroads are to go into the money markets of the world as borrowers of billions of dollars. A man must do better than graze the sharp edge of bankruptcy if he is to find himself welcomed as a prospective creditor by the investor. So the railways, if they are to carry this new burden, must not only be protected against the further destruction of their credit involved in an unending succession of attacks upon their existing revenue, they must also be permitted to earn enough to assure capital that they can pay interest and principal of the heavy additional loans asked. By the light of this practical, unchangeable fact the railway regulation of the future must be guided. If it is not, then congestion and a general paralysis of trade, costing the country more than double its whole bill for transportation, cannot be avoided.

The Railroad Securities Commission, with President Hadley at its head, the ablest and most disinterested body which has ever investigated the subject in this country, said in its report: "Where the future is uncertain the investor demands, and is justified in demanding, a chance of added profit to compensate for his risk. We cannot secure the immense amount of capital needed unless we make profits and risks commensurate. If rates are going to be reduced whenever dividends exceed current rates of interest, investors will seek other fields where the hazard is less or the opportunity greater. In no event can we expect railroads to be developed merely to pay their owners such a return as they could have obtained by the purchase of investment securities which do not involve the hazards of construction or the risks of operation."

While revenue was shrinking, the obligatory expenses of the railways of the country have increased enormously. The wages of the railroad employees in this country have reached the stupendous total of over $1,200,000,000 a year. According to the advance summary of the report of the Interstate Commerce Commission for 1911, the total number of employees in the United States decreased in that year by 29,611 as compared with 1910, while the total wages paid increased by $64,741,164. In no other occupation has such a showing ever been made. If the wage scale of 1899 had been in effect, the item of labor cost would have been some $300,000,000 less. Against liberal wages the railways do not protest, because they know that they can render safe, adequate and satisfactory service in proportion, as their employees are well fitted and well paid for their work. But new outlay must be balanced by new income unless operation is to cease. Public sentiment almost always supports the demand of employees for higher wages. Public sentiment cannot, from the point of view of either justice or safety, continue to prohibit or prevent the levying of such rates as alone will enable the employer to pay the wage rate in many cases imposed practically from without as authoritatively as are the traffic rates that a commission orders into effect.

In 1890 the taxes paid by all the railroads aggregated $31,207,469; in 1910 they had risen to $103,795,701; for 1911 they are estimated at $109,000,000 and may be a couple of millions more. The increase in twenty years up to 1910 is 233 per cent. The railroad treasury has come to be looked upon as the public milch cow, from which a new supply of nourishment may always be obtained. When the state appropriates out of the earnings of the railways, as it did in 1910, more than one-fourth as much as was paid in dividends to all the stockholders, the interest rate naturally rises and the possible supply of new capital for railway investment threatens to vanish altogether.

If you take two dollars out of your purse each time you put a dollar in, bankruptcy will happen in time. The railroads are not yet reduced to the point of collapse, because most of them are still permitted to earn and retain dividends. But their borrowing power has been cut down until it suffices only for hand-to-mouth improvement. Their credit must be so far restored as to make it equal to carrying forward the creative and constructive work which we have seen to be a condition of continued national growth. How does their record for trustworthiness stand? What have they done to show themselves fit for that larger liberty of action which is indispensable if they are to perform all the functions belonging to the proper conduct of their business?

The railroads of the United States are entitled to both confidence and relief because they have not abused their trust in the matter of capitalization. While, to make possible the raising of money, stock-bonuses undoubtedly were given in their earlier history, it is true of them as a whole today that they have by far the smallest capitalization per mile in the world; and that they have kept their capitalization low by using for betterments millions of earnings which anywhere in Europe would have been handed over to stockholders, leaving the cost of improvements to be charged to capital account. This is one of the best-established facts in railroad history, though few people yet realize how great is the difference in our favor.

The increase of capitalization per mile of railroad in England and Wales for the nineteen years between 1890 and 1909 was from $255,073 to $328,761, or $73,688; against a total capitalization for all the roads in the United States in 1909 of $59,259. It exceeded our total capitalization by $14,429 per mile. The average annual increase for the nineteen years has been $3,875 per mile, exceeding the entire annual net earnings per mile of railways in this country during the corresponding period. Our capitalization per mile is from one-half to one-fifth that of European countries; partly because the initial cost of construction was greater there, but largely because of a fixed difference

in policy. The American railway makes improvements so far as possible out of earnings or surplus, leaving capital account to carry only new construction. The European road distributes earnings among its stockholders, and issues new capital to provide necessary betterments. The difference accounts for the sharp contrasts of the figures presented above.

The American policy is in the public interest, because it tends to keep fixed charges down. A management can take its own time about replacing a surplus used for improvements. When the money has been procured by issuing new bonds, the interest on these is a mandatory charge and must be added to the total to be raised annually from rates. So far as the public is concerned, the American policy is far better. And it should be remembered that it became the American policy by choice, not of legal compulsion, at a time when managements had a liberty of action denied to them now. It would be an ironic turn of affairs if this policy, deliberately followed of their own option by railroad managements through the whole industry of American railroading, at the expense of the stockholders and because it favors the rate-paying public, should be reversed, and the burden transferred to the people's shoulders as a consequence of regulations prescribed by the people themselves. At present it seems not improbable that this will come true to some extent. A capitalization of $60,000 per mile will not transact the business of the country. On all trunk lines and wherever population becomes dense and traffic heavy, capitalization will have to be made larger for new facilities and double tracking. The heavy amounts required to provide terminals must also be charged to capital account. With wages and material as high as they are now, billions will be required. If additional money must be borrowed for the less permanent improvements of which I shall speak presently, the country will eventually have to carry a capitalization more nearly approaching that of Europe and, as a necessary corollary, rates will rise to a corresponding level.

The railways are entitled to confidence and relief because they have displayed efficiency in the conduct of their business. This is just as marked as their relatively low capitalization. The figures already given show an increase of traffic in a year about five times as great as the increase of equipment and eleven times the increase of mileage. Yet the machine has been hauling its load because efficiency has been developed. Heavier rails, larger engines, cars of greater capacity, increased train movement and the full utilization of equipment have kept business moving. The density of traffic in England, France and Germany should be as much greater than in the United States as the density in the middle exceeds that in the far western states. Yet here are the facts:

Ton Miles Per Mile of Road.

France	496,939
United Kingdom	529,622
Germany	827,400
United States (1910)	1,071,086

It is clear that our railroads have been capably managed, and that the resources and powers entrusted to them are being used to the highest business advantage. How the money they spend is being employed is shown by the fact that our railroads move 272 ton miles of freight per dollar of net revenue, where the United Kingdom shows only 58, Germany 172 and France 88. For honest and efficient conduct our railways have no equals in the world. By this supreme test they declare their fitness for the gigantic work that still remains to be undertaken.

Not only, as I have shown, have they not charged to capital the cost of improvements covered by stock and bond issues in other countries, but they have shared their gains liberally with the people through rate reductions. It has become common to think of the progressive lowering of rates, while all other charges are rising, as the work of legislative compulsion. On the contrary, many of the most important reductions made in the past were voluntary. These are the lowering of charges on the great staple products of the soil. This has made settlement possible. It has made it possible for the farmer to realize the benefit of high prices for his crops. It has doubled production again and again. It has made possible the movement of lumber from the Pacific Coast to the Middle West and even the eastern markets. It has become a definite policy. And it has left in the pockets of the people an enormous amount of money that would have gone to the carriers or at least been shared by them if they had fought against cheap transportation for the farm instead of fostering it. If the freight and passenger rates in force on the Great Northern system in 1881 had remained unchanged until 1910, there would have been collected from the public $1,267,411,954 additional. This amounts to more than eight times the average par value of its outstanding stock and bonds in the hands of the public during the same period. That is to say, if there had been no rate reductions on that system during the past thirty years, it could have paid off its entire capitalization every three and three-quarter years. If railroad rates in the United States had increased as much in proportion as the prices of commodities and the wages of labor between 1894 and 1909, the country's bill for transportation for those fifteen years would have been over seven billion dollars more than it was.

The railroads, then, have proved themselves competent and trustworthy. But if they are to furnish the necessary additions and provide new terminals, without which the traffic of the country can no more continue to move than a derelict can voyage from port to port, the money will not come, as a magician catches coins, out of the air. It must be either earned or borrowed.

The theory of encouraging home industry has prevailed in this country during the greater part of our national existence. Import duties averaging 41.22 per cent. were levied in 1911. The advocates of the system claim this is done to protect American labor. Our manufacturers are protected as a matter of national policy. Transportation costs the public from one-third to one-half as much here as in Europe. This cheapness is not purchased at the cost of the workingman. In 1910 the average daily earnings of railway employees in the United States were more than twice as great as in the United Kingdom, and two and three-quarter times as much as on the Prussian-Hesse system in Germany. As employers of labor and also as manufacturers of a commodity that everybody uses directly or indirectly, paying that labor more than it receives anywhere else in the world and supplying that service for less than is charged anywhere else in the world, the railroads deserve a public consideration not extended to them now.

Second, the railroads should be permitted to earn and hold a surplus equal to fifty per cent. of the amount they pay out in dividends, to be held for emergencies and applied to improved facilities. There are many expenses, and new ones constantly arising, that must not be added to capital charge unless rates are to be made that the public cannot and ought not to be asked to bear. In addition to the heavy demands of the ordinary growth of traffic, there are many extraordinary expenses. Public authorities do not hesitate to order the railroads to provide additional equipment. This, being only partially under the owner's control, is soon scattered over the country. The weaker roads prefer paying a per diem charge to buying for themselves. This compels the stronger roads practically to provide new equipment for the whole country and pay the cost of it from their own resources. Grade crossings must be eliminated in both the cities and the country. The ordering of these is held to be a legitimate part of the police power of the state, whose exercise is unlimited. To raise or lower tracks at a single city may cost millions of dollars. This class of expenses grows very rapidly in the United States as population becomes denser. Shall we capitalize them also, as has been done abroad? Safety appliances must be adopted. Ingenuity is adding yearly to the number of these; and the public demands rightly that they be put into use as soon as their value is demonstrated. But all these things take money—and a lot of it.

Steel cars are a good illustration of this kind of expense. They are coming into general use, and it has been proposed to make their purchase and employment compulsory even before their

benfits have been fully proved. To buy them is a big expense, but that is only the beginning. A train made up of them is sixty-five per cent. heavier than one composed of old-style cars. More trains must be run to render the same service. Tracks and bridges must be strengthened. So the cost of service is increasing all the time through improvements that the railroads are just as anxious as the public to adopt. Every one of these improvements costs money. Very few of them produce one dollar of additional revenue. Yet the railroads must pay their bills or go into the hands of a receiver. Such an increase of rates as will cover these expenses; the accumulation of at least such a surplus as will furnish funds for these daily demands in the domestic economy of the railroads, must be authorized, unless traffic is to decrease, transportation facilities to grow worse instead of better, or capitalization to be increased until any rates that the people can pay will fail to cover the fixed charges of the common carriers.

An extraordinary doctrine is now being propounded in many quarters. It is held that the accumulation of a surplus is evidence that rates are too high and ought to be lowered; just as if the man who earns, saves and puts a dollar in bank to meet future contingencies thereby admitted himself guilty of either dishonesty or extortion. It is held that a railroad has no right to receive or enjoy income derived from any other source than the operation of its plant. It is asserted that a railroad has no right to the natural increment in the value of its property, though this is not denied to any other corporation or to any individual under like circumstances.

The state has taxed surplus and all improvements made from it just the same as those made from the proceeds of stock and bond sales. Can it do this—can it tax all earnings, improvements made from earnings and surplus without confessing that the holders are entitled to the property and the income from it as truly as the state is entitled to the tax?

It is not a political but an economic question that the country has to consider and solve. The adjustment of tariff taxation, the regulation of railroads and all other similar matters over which the legislative power has control and which are essentially economic and non-political are held deliberately within the range of current controversy for the advantage of party politics. So long as they can be kept from a fair and permanent settlement on the basis of economic justice, they will furnish rallying cries for the unthinking of one political party or the other. The country cannot rise to the level of its duty or its opportunity until the scientific knowledge of the expert and the action of the just judge are applied to the settlement of such economic issues. The American people must soon begin to realize how injuriously they are themselves affected by a game that has been played for so many years with their business prosperity and their future welfare. Meantime the practical questions that I have presented and that grow straight from the root of the present situation remain. The wisdom, the desire for justice, the intelligent self-interest of the whole country should be concentrated upon the answer, which is not really difficult to find. The people must first realize that regulation must not be strangulation. Every restriction compatible with the public interest may be applied without impairing the position of the railways, or their ability to continue serving the public; because their interests at bottom are one. It is high time that a national perception of this identity should put an end to hostile discrimination against the railroad, and a policy shaped which will permit the railways of the country to lay a broad foundation for transacting the future business of the country, by providing the machinery without which that business cannot be done.

Courts and commissions will see that excessive rates are not collected. On the other hand, the courts have affirmed the right of the companies to earn a reasonable return on the total value of their property. Between these well-marked lines the railway rate should move, according to the needs of traffic and the development of the business of the country. Rates either permanently unchanged at the present figure or lowered by compulsion mean, in view of the existing emergency, nothing but ruin. That ruin will not be so immediate or complete for the railroads themselves as it will be for the business interests to which they will no longer be able to give a prompt and adequate service. It will be far-reaching, because its effects will touch every man, however humble, who is engaged in productive industry. If it comes it will be the most disastrous catastrophe in all our business experience.

Across every stream of commerce where it enters a distributing city an obstacle grows higher every day, restraining the impatient tide of the nation's exchanges. It is time for all of us to lay aside prepossessions, hostilities, differences in points of view, and work together for an object, infinitely more essential than most of the great enterprises deemed so national in their scope and benefits, that they command not only the sympathy but the financial backing of the government itself.

No national or municipal campaign, no moral crusade, no commercial or financial adventure or assurance can demand or ought to receive from you and others like you the attention, the study, the energetic support claimed by the imminent and urgent issue which I have tried to present in outline. In a day of big things it looms above them all. The railways, anxious to be active in the upbuilding of the country and the introduction of a coming era in transportation, stand at attention. Will the country give the word of permission and remove the heavy cloud of doubt and depression which has steadily arrested the growth of the nation's commercial facilities?

SPECIFICATIONS.*

By O. S. Beyer, Jr.

Specifications are important and valuable for the following benefits which result from their use:

Bidders are placed on a strict and fair competitive basis regarding quality as well as price.

The selection of the most desirable bid is simplified, and controversy and criticism are minimized when awards are made.

The field from which materials and equipment are selected is broadened since trade names are ignored and comparatively unknown materials and equipment offered by responsible bidders may be accepted without detriment to the purchaser.

The railways are insured against the delivery of imperfect, poor or wrong materials and equipment, and they are saved disputes and troubles arising from the condemnation of and the use of inferior, unsuitable and inadequate material and equipment.

A definite basis for acceptance or rejection is established.

Constant inspection and analysis and record of service rendered by materials and equipment made to specifications furnish a check on the practical results obtained, and also furnish additional information and experience which are helpful in effecting improvements in the specifications and hence in future supplies and equipment purchased.

In order that the foregoing advantages may be fully secured, it is necessary that specifications be: Clear and concise, definite, logically arranged, uniform for the different railroads, and complete and thorough.

The language of specifications should be simple and plain. Short sentences are best. Punctuation and grammar are important. Ambiguity should be studiously avoided. While specifications should be comprehensive, they should not be verbose. Conciseness should be carefully sought.

Definiteness is secured—first, by good English; second, by the avoidance of such hazy terms as "general," "about," "etc.," "ample," which signify nothing specific; third, by distinctly pointing out what is required.

Uniformity is secured by adopting the approved, recommended

*Abstract of a paper presented before the Western Railway Club, December 17, 1912.

or standard practices and specifications of the main railway and engineering societies and railway systems.

The entire subject of the specification should be thoroughly studied and the subject matter of the specification so prepared that full compliance with it will insure the furnishing of the material or equipment best suited without unnecessary refinement and expense.

When it is desired to prepare specifications in accordance with the elements outlined the following is essential: To know exactly what is wanted; what can be obtained; what other people are getting, and, to some extent, how different materials and equipment are made.

Many of the important materials purchased by railroads are furnished to specification of some sort, and they can be made to apply with decided profit to many of the less important materials where they are not now used. A greater uniformity in the detail requirements of many of the specifications used by railroads will result in economy for all. A large variation exists in the detail requirements of a great many covering the same material used for identical purposes. This lack of uniformity increases the cost of manufacture and also causes car and locomotive builders to purchase small quantities of a large variety of similar materials to be held in stock. Naturally this does not help to decrease the cost of building equipment. By eliminating this lack of uniformity, manufacturing and building expenses will be reduced, and inspection might be simplified by arranging a pooling of the inspection forces of different railroad companies.

A difficulty often encountered in the purchase of machine tools and special equipment, particularly by the companies asked to submit proposals, is the absence of definite information on just exactly what is required. A definite and complete specification outlining clearly what is desired will guard against unnecessary trouble before and after purchase. It will insure the submitting of intelligent and complete bids which are strictly comparable with one another. Specifications thus employed will further prevent the furnishing of machinery which is incomplete or unsuited for the purpose desired. The large number of different tools and special equipment including lathes, vises, pumps, planers, drill presses, feed water heaters, boilers, coaling and wrecking cranes, so frequently purchased, should all be covered by specifications similar to the one just outlined. Of course, special construction and unnecessary refinement should be avoided. It should not be difficult to see that a careful specification covering a machine will greatly simplify its purchase and guard against subsequent installation and service trouble.

Specifications for cars and locomotives are usually very incomplete. The subject matter is too general and indefinite. The established standards and approved practices of the railway company are not always included. Very much is left to the builders who naturally introduce their own standards and methods. From the basis of subsequent maintenance economies, this is not to the best interest of the railway companies. Builders having no complete and definite specifications to go by when making bids are tempted to reduce their manufacturing costs at the expense of quality of material, workmanship and construction, so that they may be enabled to submit prices which will be lower than those of their competitors. Experience has taught that builders should not be expected, without explicit directions and a definite understanding, to build equipment which will be the best for the service and the most economical to maintain.

The costly results of the lack of complete and definite plans and specifications are not hard to find. A view over the tracks where crippled cars are undergoing repairs will show many weaknesses in car construction, which would never have existed if these cars had been built according to carefully prepared plans and specifications in which first cost was not the only consideration. A walk through the roundhouse and the back shop will reveal similar weaknesses in locomotive construction.

Operating costs are also injuriously affected by the lack of adequate specifications. Motive power selected, if not selected as a result of a complete and thorough investigation of all the operating conditions, will not effect the greater economies in operating expenses that could be effected. The railway companies are in the best position to study all the conditions which influence the proper selection and specification of cars and locomotives.

Considerable may be done by the principal railway engineering societies in establishing rules and forms, if nothing more, to govern the preparation of specifications for cars and locomotives similar, somewhat, to the rules and forms adopted by the American Society for Testing Materials covering the form of material specifications, and also similar to the form of the specification adopted by the Conference Committee of the American Railway Association and the United States Post Office Department. Such standard forms would insure clearness, definiteness, logical arrangement and completeness. They would also greatly simplify the work of preparing specifications.

A thoroughly organized test department with a full quota of inspectors under a competent engineer of tests is absolutely necessary to insure the furnishing of materials and equipments strictly in compliance with specifications. The furnishing of suitable materials, machines, special equipment, cars and locomotives will be safeguarded by a strong, capable inspection and test organization. The policy of railways should, therefore, be to maintain a well balanced test department.

The preparation of good, thorough specifications is the duty of the mechanical engineer and his staff, collaborating with the engineer of tests and the practical men in the field. However, the mechanical engineering staff is often too limited in number to fully and properly study and prepare such specifications. The extremely short time usually granted in which to prepare plans and specifications is another serious condition which prevents the turning out of sufficiently comprehensive specifications. The great good which a thoroughly organized engineering staff can accomplish by carefully studying equipment selection in relation to the many conditions which affect it, the investigation of new and improved devices, methods and materials and the preparation of complete and accurate plans, should be more thoroughly appreciated. The experts of many of the leading supply and engineering firms are always willing and ready to co-operate with the mechanical engineer and his staff.

The return from a complete and capable mechanical engineering organization is not direct, and can hardly be proven by simple figures. Hence, perhaps, the reluctance with which the pay-roll is increased to make possible the employment of draughtsmen and engineers to prepare first-class and thorough plans and specifications. This reluctance should pass away when the entire situation is logically viewed and the great benefits which result, from the good work of a competent mechanical engineering staff are considered.

AUSTRALIAN RAILWAY PROPOSALS.—A short time ago the Queensland Premier said he had not heard anything definite as to the proposal to link up New South Wales and Queensland railways, via Kyogle and Beaudesert, but there had been some talk of establishing connection between Kyogle and Killarney, via Acacia Creek. The government did not intend to consider any railway proposals this year, but when some of the railway problems now in hand were disposed of, it would be time enough to deal with interstate linking up.

RAILWAYS IN SUMATRA.—The Dutch Indies government now has in Sumatra a line known as the West Coast of Sumatra Railway, which is 152 miles in length, of 3 ft. 6 in. gage, and equipped with 65 locomotives, 74 passenger coaches, and 634 freight cars. This line serves only a very small portion of the west coast of the island, connecting the port of Padang with Fort de Kock, and having three short branches. The only other existing railway in Sumatra is the Deli Railway, a private line on the northeast coast in the rich tobacco-growing district of Deli. This railway radiates in several directions from the capital city of Medan, and comprises about 80 miles of 3 ft. 6 in. gage.

INTERSTATE COMMERCE COMMISSION'S ANNUAL REPORT.

The Commission Renews Its Recommendations for a Physical Valuation and for Control Over Railway Capitalization.

The Interstate Commerce Commission has sent to Congress its twenty-sixth annual report. The opening paragraphs summarize the work of the Commission. Complaints classed as informal have been received to the number of 6,550, an increase of 2,225 over the preceding year. In the "special docket"—overcharges—6,009 applications have been filed. Orders issued, 3,096; aggregate reparation, $295,011, a decrease of $34,376; complaints dismissed, 799. The fourth section docket had 1,993 applications; orders issued, 1,828; of which 1,587 granted relief.

The number of formal complaints filed during the year was 755, a decrease of 126, as compared with the previous year; 778 cases were disposed of, an increase of 126. The Commission conducted 1,154 hearings, as compared with 943 the previous year, and took 125,000 pages of testimony.

SUSPENSION OF ADVANCES.

In the exercise of its authority to suspend the operations of new tariffs, the Commission has undertaken to distinguish between current changes in rates which might be regarded as natural and normal readjustments occurring in the ordinary course of business, and distinct and material advances for the definite purpose of increasing rates; and in the latter class of cases it has undertaken to scrutinize the apparent reason therefor. * * * Since December 1, 1911, the Commission has suspended tariffs in 120 cases, and has declined to exercise this authority with respect to proposed changes in 112 cases where protests were made by shippers.

Since June 18, 1910, when the Commission was authorized by the act approved on that date to suspend new tariff schedules, pending investigation, that authority has been exercised in 189 cases. A list of these, showing the disposition made of each case, is given in the appendix to the report.

Of the investigations which have been completed up to this time the advances proposed by the carriers were condemned in 32 cases; the advances were allowed in whole in 30 cases, and allowed in part in fifteen cases; and in 22 cases the proposed advances were withdrawn by the carriers after suspension, and no further action by the Commission was deemed necessary.

EXPRESS RATE INVESTIGATION.

The investigation of the express companies has been concluded during the year. The report of the Commission is declared to have worked a revolution and renovation in the methods and rates of express companies. "The double collection of charges has been prevented, discriminatory rates have been or will be abolished, through routes have been and are being established, which will secure a direct and properly expeditious service, and a new and original system of stating express rates, by blocks, has been devised, and will soon be put into operation, under which it will be possible not only for the express agent himself, at a given station, to determine at a glance the rate between his office and every other express office in the United States, but even the shipper can qualify himself by a few moments' study to ascertain the same facts." The report says that this is probably the most important single piece of work ever done by the Commission. Similar investigations are now in progress upon various matters, including the substitution of freight where stopping-in-transit has been allowed; allowances to terminal railroads; the weighing of carload and less than carload freight; the issuing and use of passes, franks and free passenger service; bills of lading; private cars; and rates on anthracite coal. These investigations are of necessity largely conducted by the members of the Commission in person "and occupy a very considerable portion of our time."

TARIFFS.

The number of tariffs filed in the 12 months ending November 30 was 108,766, which is less than half the number filed four years ago—a result of the Commission's regulations. The report gives a summary of the work of the railways' committees which are trying to work toward a uniform classification of freight.

DIVISION OF INQUIRY.

In the year ending November 30, ninety-three indictments were returned for offenses against the act to regulate commerce. Several of these were against two or more defendants jointly. Thirty-four indictments were against carriers or carriers' agents, 54 against shippers or passengers and five against carriers and shippers jointly. Of the indictments against shippers, 25 were for the offense of misbilling. Of the total number of indictments returned during the year, 28 were for fraudulent transactions in connection with the operation of stopping-in-transit privileges.

During the same year 61 prosecutions were concluded. In 47 cases the defendants entered pleas of guilty. In six cases verdicts of guilty were rendered by juries. In one case a verdict of not guilty was returned by a jury. Seven cases were dismissed. In nearly every instance dismissal was due to the fact that alternative indictments had been returned for the same offense.

The total amount assessed as penalties in the cases concluded by pleas of guilty and by verdicts of guilty was $344,420. Of this amount $207,000 was assessed against carriers or carriers' agents, and $137,420 against shippers or passengers. The penalties in particular cases ranged from a minimum of $10 to a maximum of $55,000.

The report rehearses the principal points of law determined by the courts during the year. It has been held that proof of posting of rates need not be made in prosecutions against shippers charged with accepting rebates; that a carrier on trial for rebating cannot be allowed to make the defense that it was in error regarding its established rates; that in case of transportation partly by water and partly by rail the jurisdiction for departure from the established rates may be exercised by the District Court of any district through which the transportation passes.

There have been five cases of imprisonment for violation of the act to regulate commerce. They were all in the southern district of New York. The imprisonment in each case was for one day, but there were heavy fines. The offenses consisted in the collection of rebates under the guise of commissions for the solicitation of traffic.

"During the year," says the report, "the various indictments against the ore-carrying roads owning docks at the various Lake Erie ports, and also against the companies formed to lease and operate such docks, have been concluded, pleas of nolo contendere being entered and total fines of $123,000 being imposed." In these cases the Commission believes it to be finally established that carriers leasing terminal facilities to certain shippers, and thus creating discriminations as against other shippers not enjoying such leases, become criminally liable, and also that the shippers enjoying such discriminations are criminally liable.

FOURTH SECTION.

The report discusses at some length the doings of the Commission in relation to the law, as revised, concerning long and short haul rates. Since the date of the last annual report, when 5,030 applications had been filed for permission to deviate from the general requirements of the long and short haul clause, hundreds more have been filed. The Commission has issued a number of permissive orders and is now waiting for a decision from the Supreme Court interpreting the act, to take more definite action.

COURT DECISIONS.

The report reviews the 14 cases affecting the Commission which have been decided by the Supreme Court during the year,

and says: "The central thought to be gathered from this exposition of the law seems to be that the administrative judgment of the Commission, as expressed by its orders, cannot be reviewed by the courts, in so far as they are within its delegated authority, not confiscatory, and not palpably arbitrary and unreasonable."

Twenty-nine suits have been filed in the Commerce Court to annul orders of the Commission, and applications to the Commerce Court for preliminary injunctions were made in 15 cases, but three of the cases were dismissed for want of jurisdiction. Preliminary injunctions were granted in two cases and denied in four, and applications pertaining to the remaining six cases are now before the court.

During the year the Commerce Court has decided upon their merits 11 cases. In four, the orders of the Commission were annulled; and in seven, including three which were afterward dismissed for want of jurisdiction, the orders of the Commission were sustained.

In 11 cases, where negative orders of the Commission were involved, decrees of dismissal were entered by the Commerce Court, following the decision of the Supreme Court in the Procter & Gamble case. Ten cases were dismissed on application of the petitioners, and eight were dismissed in compliance with mandates of the Supreme Court.

There are now pending before the Commerce Court 22 suits involving orders of the Commission, ten of which are awaiting decision, but this includes the six which are before the court for determination upon motions for preliminary injunctions. The remaining 12 are not yet ready for hearing.

RAILWAY RECORDS.

The report describes briefly the forms that have been prescribed for the keeping of the accounts of railways, express companies, pipe lines, etc.

Examination of the accounts of railroad companies has been continued during the year and the value of this work is increasingly apparent. Different companies put different interpretations on the requirements of the commission. Property accounts are not always kept in such a way as to show the proper relation between expenditures and the par value of securities issued. The commission's order covering its classification of expenditures for road and equipment, effective on July 1, 1907, prescribed that after that date all entries in such accounts should be in terms of cash. The general examinations since made have developed the fact that in some cases items entered in the property accounts have not represented simply expenditures in terms of cash, but have been greatly in excess of such expenditure, whereby the wide disparity between the cost of property and the par value of securities issued has been concealed. Instances have been found of the misstatement of revenue and expense accounts to such extent that the apparent results of operation were materially affected, an actual deficit or surplus being reported as the opposite. In a number of cases of the more flagrant violations disciplinary measures will be adopted. But the general attitude of carriers is one of hearty co-operation.

In the routine examination of accounts practices of a questionable nature are sometimes discovered. The routine work also qualifies the examiners to make special investigations. On the question of abuse of privileges of stopping-in-transit the examiners were able to secure accurate information of the practices of twenty railroads in two weeks, and some of these practices were found to be contrary to the rules.

STATISTICS.

Under the head of statistics the report contains a number of summaries from the statistical report proper. These include: A summary of the annual income accounts of 126 companies earning of $10,000,000 yearly; of the earnings and expenses of roads earning over $1,000,000 yearly and a similar statement for the three months, July-September, 1912; summary income account of the 12 big express companies, and one of the Pullman Company.

Telephone companies, now subject to the Interstate Commerce law, have been looked into, but it is very difficult to get satisfactory information concerning the multitude of small concerns.

The report gives an account of the status of water carriers, as fixed by the Supreme Court decision of last April and by the Panama canal act.

ACCIDENTS AND MATTERS OF SAFETY.

The report gives the usual tabular summaries of accidents for the year, and in addition gives, for eleven years, the causes of derailments in considerable detail, defects of roadway being shown under six heads, and of equipment under 12.

The safety appliance act has been vigorously enforced. During the fiscal year 177 cases, involving 499 violations of the act, were transmitted to the several United States attorneys for prosecution. The railroads confessed judgment as to 338 violations and prosecutions were dismissed as to 23 counts. During the same period 28 cases, involving 144 violations, were tried before the courts, of which 121 counts were decided in favor of the government, and eight in favor of the defendant, decision being reserved as to the remaining 15 counts. Penalties aggregating $40,400, in addition to costs, were collected.

The circuit and district courts have rendered a number of decisions during the year, strengthening the Safety Appliance law; but there have been some conflicting opinions.

A number of roads have been prosecuted for violation of the ash pan law.

There have been transmitted by the commission to United States attorneys for prosecution 217 cases, involving 2,135 violations of the hours-of-service law. The railroads have confessed judgment in 727 counts. Twenty cases, involving an aggregate of 110 violations, were tried, in 82 of which there was a verdict for the government, the remaining 28 counts being decided in favor of defendants. Two hundred and one counts were dismissed. Penalties aggregating $25,835 were collected.

Nine decisions of the courts concerning the hours-of-service law are reported. The railways are now required to keep on file full reports of all train delays which may have led to employees being kept on duty beyond the statutory period. The report says that instances in which excessive hours have contributed to accidents "seem to have almost disappeared." Cases of excessive service continue in large numbers, but some roads have improved. Inexcusable delays continue to be reported by the roads as excusable.

Investigation of Accidents.—Up to September 1, 1912, 81 accidents had been investigated, 49 of which were collisions and 31 derailments, the other one being a grade-crossing accident. The railroads generally are replacing their older cars with cars of all-steel or steel-underframe construction as rapidly as conditions will permit. Of the 81 accidents investigated up to September 1, 52 were caused by mistakes on the part of employees. These 52 accidents comprise 48 of the 49 collisions investigated, and 4 of the 31 derailments. They caused the death of 248 persons and the injury of 1,309 persons. Of the 48 collisions caused by errors of employees 33 occurred on roads operated under the train order [time interval] system, and 15 occurred under the block system.

"There is a disposition in some quarters to charge these lamentable errors to failure of discipline and to hold employees wholly responsible for such failure. This is a superficial view which contains no promise of effective remedy. It cannot be assumed that employees deliberately ignore disciplinary measures which they know from experience are necessary for their own safety; nor is it conceivable that rules which have been enacted to secure safety in the movement of trains are disregarded by employees, knowing that the result may mean their own death, except under pressure of some compelling motive that for the moment overcomes the force of the regulations.

"The increase in casualties to employees during the past year and the numerous fatal accidents to passengers which have oc-

curred in recent months provoke the inquiry whether additional legislation may not be directed toward safety of operation. The commission is giving this matter careful attention, but is not prepared at this time to make a definite recommendation.

"To prevent railroad collisions adequate measures must be taken to reduce the chances of human error to a minimum and to neutralize the effects of such error when it occurs, the commission holds. It is not probable that a satisfactory code of train rules which will meet all demands can be secured without action by the federal government."

The commission repeats its recommendation that the adoption of the block system be required by law. "Although the most serious collisions in this country were on block-signaled roads, yet from the standpoint of safety the block system is superior to the train-order system, because it presents fewer opportunities for men to make mistakes. When used in connection with a code of operating rules, together with the necessary reformation of operation and disciplinary measures, it would greatly increase the safety of railroad travel."

Boiler Inspection.—The boiler inspection law of February 17, 1911, has been enforced vigorously. The railways in reporting descriptions of boilers make many mistakes, and 6,000 cards (out of 34,000) have had to be returned for correction. Inspectors report all defects, even if these have not become serious enough to violate the law; and thus the inspections tend to prevent violations and to make it unnecessary to prosecute. The boiler inspectors have investigated 255 accidents. To facilitate this work and save time one of the assistant chief inspectors now has his office at Denver, Colorado.

"During the year 74,234 locomotives were inspected, 48,768 of which were found defective; 3,377 locomotives were ordered out of service for repairs.

"In addition to this, the following locomotives were required to be strengthened or changed to comply with the requirements of the law or permanently removed from service:

Pressure reduced to insure a proper factor of safety	699
Seams reenforced by welt plates to insure a proper factor of safety	327
Permanently removed from service on account of defective condition	698
The lowest reading of water glass ordered raised to comply with the law	992
Lowest gage cock ordered raised to comply with the law	408
Ordered strengthened by having braces of greater sectional area applied	351
Additional support ordered for crown sheet	116

"Thus 6,968 locomotives were either held out of service for repairs or changed and strengthened to conform to the requirements of the law or permanently removed from service.

"This work has been accomplished without the necessity of resorting to the courts in a single instance to enforce the requirements of the law or the lawful orders of the district inspectors. Of the 3,377 locomotives which have been ordered out of service only five cases have been appealed to the chief inspector, in three of which the orders of the district inspectors were sustained and two reversed. In the efforts of the chief inspector to carry out the provisions of the law he has had the co-operation of the railroad officials on practically all roads. Wherever he has met with opposition it has usually been found due to a lack of proper organization or equipment to properly perform the work as required. A marked improvement in this condition of affairs is, however, already manifest, and the necessary action is being taken to bring about a proper observance of the law in all cases."

Conclusion.—The commission, in conclusion, renews its recommendations for legislation providing for a physical valuation of railroads, a uniform classification of freight, a more explicit definition of the authority of the commission over telegraph and telephone lines, and control over railway capitalization.

SWISS RAILWAY EARNINGS.—The receipts of the Swiss State Railways for 1911 were as follows: Passenger traffic, $15,001,890; freight traffic, $21,263,988; other receipts, $1,458,926, a total of $37,724,804. Expenditures were $22,664,762, making a balance in favor of the government of $15,060,042.

CHROME-VANADIUM DRIVING WHEEL TIRES.

In an attempt to reduce the excessive wear on driving wheel tires, one of the large railways recently experimented with tires made of heat treated chrome-vanadium steel. These tires were applied to a Pacific type locomotive weighing 229,500 lbs. total, and 150,500 lbs. on drivers, which was put in service on a division having numerous curves ranging from 3 to 14 degrees curvature. The average number of brake applications per trip were nine for station stops and four for crossings and slow-downs. Although flange lubricators were used on the other locomotives on this division none were applied to this locomotive.

These tires, after an engine mileage of 121,000 miles, were found to still have good contours but because of necessary repairs to other parts, the locomotive was shopped. A sister engine in identical service had a new set of carbon steel tires applied one month after the vanadium tires were put on and these tires gave a mileage of only 60,040 miles before having to be turned. It was necessary to reduce the diameter of these tires by ¾ inch in order to build up the worn flange.

In switching service, chrome-vanadium tires have given fourteen months' service, double turn, with a maximum wear of only ¼ inch. It is reported that these tires, which are now on their third term of service between turnings, will probably be good for a fourth term.

Other railways, in considerable numbers are now ordering tires of this material and a specification has been prepared after exhaustive experiment and research by the tire makers and the American Vanadium Company. In developing this specification the effort was to determine the particular chemical composition of chrome-vanadium steel and the proper heat treatment which would give the highest wearing qualities.

The success of the specifications, which are given in full at the end of this article, are illustrated by some tests recently made on tires manufactured under them. Three tires, one each manufactured by the Midvale Steel Company, the Standard Steel Company and the Latrobe works of the Railway Steel-Spring Company were subjected to physical and chemical tests with the results given in Table I. For comparison the properties of carbon steel tires are given in the last column.

The strength and toughness of heat treated chrome-vanadium steel is clearly shown by the drop tests of each of these tires. A summary of the results secured is given in Table 2. The accompanying illustration Fig. 1, shows the tire manufactured by the Standard Steel Works Company after being subjected to the drop test. In this test, the tire was 48½ inches internal diameter, 3⅝ inches thick. A deflection of 4 3-16 inches was required by the specifications, and a total of 5 5-16 inches was obtained after a total of 37 blows from different heights up to 25 feet.

In the drop test of the Midvale Steel Company, the tire was 55⅝ inches internal diameter and 3⅞ inches thick. All blows were from a height of 40 feet, seven blows in all were given. A total deflection of 5 7-16 inches was obtained, 4⅜ inches deflection being required by the specifications. The tire manufactured by the Latrobe Works of the Railway Steel-Spring Company was 56 inches internal diameter and 4 inches thick. Under the specifications a deflection of 3 11-16 inches was required. The total deflection obtained was 5 inches, after a total of 22 blows from successive heights up to 30 feet, the limit of the drop.

Comparison of the micro-photographs of heat treated chrome-vanadium and untreated carbon steel tires in general use indicates graphically one of the reasons for the higher wearing qualities of the former.

Figure 2 is a micro-photograph of one of the heat treated chrome-vanadium tires used in the drop tests. This is representative of the micro-structure of the whole tire section from thread to bore. It was made from a piece cut from the exact center of the tire section, which theoretically should show the

coarsest micro-structure or grain of the tire. Figures 3 and 4 are micro-photographs of a well made, untreated carbon steel tire representative of the present standard. Figure 3 shows the micro-structure of a piece taken close to the thread. This micro-structure was present to the depth of about a quarter of an inch below the tread. From that point the grain increased in size, giving a micro-structure as shown in Figure 4. This is the

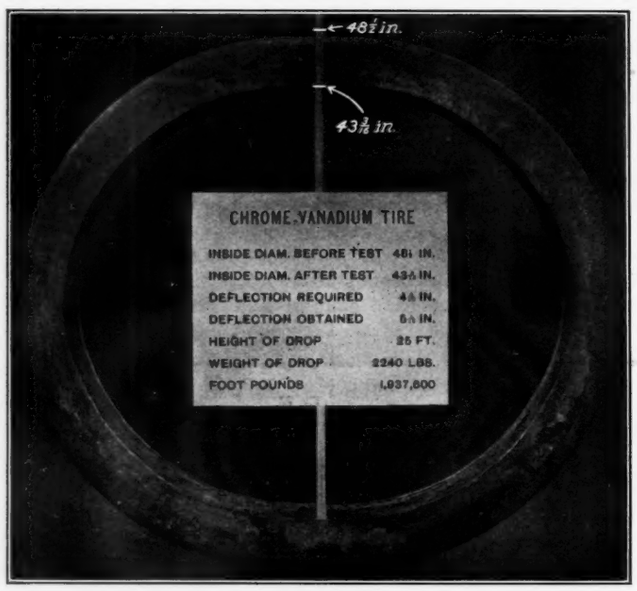


Fig. 1—Chrome-Vanadium Driving Tire After a Drop Test.

typical micro-structure which exists throughout practically the entire section of the untreated carbon steel tire. The closer grained structure shown in Figure 3 is often largely removed in turning and boring the rough tire.

SPECIFICATIONS FOR HEAT TREATED CHROME-VANADIUM STEEL TIRES.

1. Steel for tires shall be made by the acid open hearth

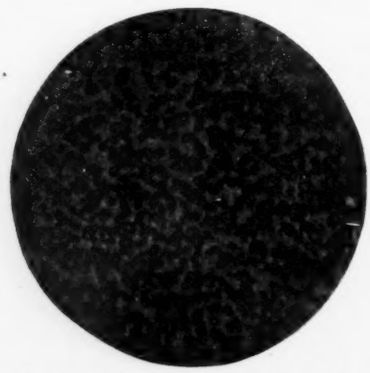


Fig. 2—Micro-Photograph of Chrome-Vanadium Steel Tire. Magnified 170 Diameters.

process. Sufficient discard shall be made to insure removal of piping and segregation.

2. Chemical Composition:

Carbon	0.50 to 0.65 per cent.
Manganese	0.60 to 0.80 per cent.
Chromium	0.80 to 1.10 per cent.
Silicon	0.20 to 0.35 per cent.
Vanadium	Over 0.16 per cent.
Phosphorus	Not over 0.05 per cent.
Sulphur	Not over 0.05 per cent.

The higher range in carbon to be used for switch and freight engine tires, and tender and car wheel tires; the lower range in carbon to be used for passenger engine tires.

The above limits are rejection limits for samples taken at any stage of manufacture.

3. Drillings from a small test ingot cast with the heat or turnings from a tensile specimen or turnings from a tire (where tires are machined at the works of the manufacturer) shall be used to determine whether the chemical composition of the heat is within the limits specified in paragraph 2.

4. Physical Requirements:

Tires Over 56 In. Inside Diameter.

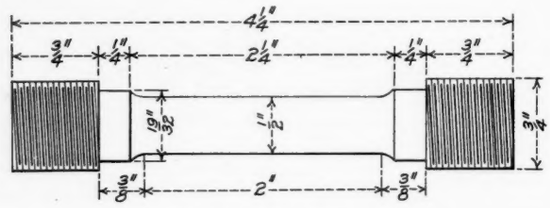
Elastic limit	95,000 to 115,000 lbs. per sq. in.
Ultimate strength	125,000 to 140,000 lbs. per sq. in.
Elongation in 2 in	Minimum, 15 per cent.
Reduction of area	Minimum, 35 per cent.

Tires 56 In. Inside Diameter and Under.

Elastic limit	110,000 to 125,000 lbs. per sq. in.
Ultimate strength	140,000 to 160,000 lbs. per sq. in.
Elongation in 2 in	Minimum, 12 per cent.
Reduction of area	Minimum, 30 per cent.

The elastice limit to be obtained by means of an approved extensometer. The ultimate strength is not to be considered as a requirement, but must in all cases be reported, and should approximate the above ranges.

5. The standard turned test specimen, as shown in the illustration, ½ inch in diameter and 2 inches gauge length, shall be used to determine the physical properties as specified in paragraph 4.



Standard Test Piece.

6. Should a falling weight test be required, one tire from each heat shall be selected and tested as described in paragraph 10. When such a test is made the tensile test specimen to determine if the steel meets the physical requirements of paragraph 4, shall be cut cold from the tested steel. The location of this

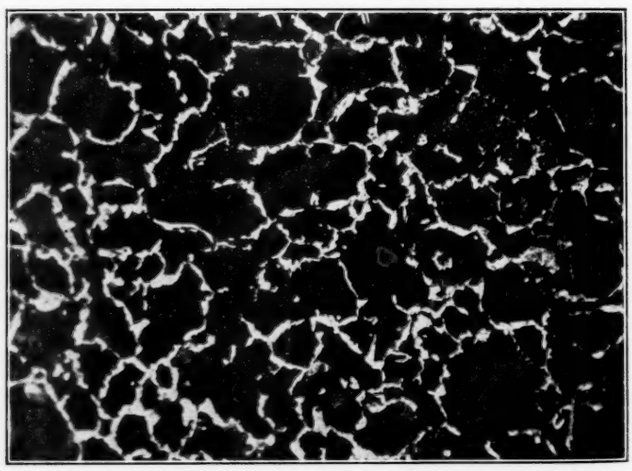


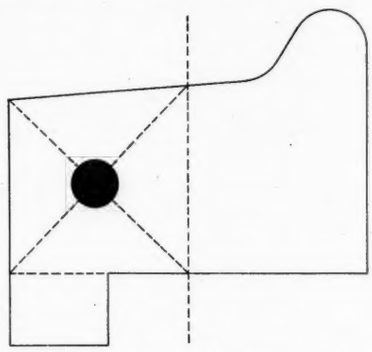
Fig. 3—Micro-Photograph of Carbon Steel Tire at Point Close to Tread. Magnified 60 Diameters.

test specimen shall be midway between the tread and the bore and midway between the face of the tire and a line passing through the center of the tire from tread to bore as shown below.

7. Should no falling weight test be required by the contract the physical properties of each heat of steel shall be determined by a test specimen cut from a bar 6 ins. x 4 ins. x 9 ins., forged from an ingot, and heat treated with the tires. The location of this test specimen to correspond to location of test piece when taken from a tire.

8. When required, the purchaser or his representative shall be furnished with copies of all chemical analyses and physical tests, and be privileged to witness all physical tests.

9. HEAT-TREATMENT: The heat-treatment shall consist in reheating the tires after rolling, and then quenching in oil; the tires to be then reheated slowly and uniformly to a temperature sufficiently high to obtain the desired physical properties. The tire must be held at this final temperature at least two hours.



Location at Which the Test Specimen Shall Be Taken.

The tire should then be withdrawn from the furnace and allowed to cool in still air. The recommended temperature for quenching is about 1,600 deg. F. The final heating for obtaining the physical properties specified should be approximately 1,100 to 1,200 deg. F.

10. Should the contract call for a falling weight test, a test tire from each heat represented shall be selected by the purchaser or his representative, and furnished at his expense provided it meets the requirements.

The test tire shall be placed vertically in a running position under the drop, on a solid foundation with an anvil weighing at least ten tons, and shall be subjected to successive blows from a tup weighing 2,240 pounds, falling from heights of 10 feet, 15 feet, and 20 feet and upwards until the required deflection is obtained as specified below.

The test tire shall stand the drop test described in foregoing paragraph without breaking or cracking and shall show a minimum deflection equal to $D^2 \div (40T^2 + 2D)$, D being the internal diameter in inches and T the thickness of the tire at center of tread in inches.

Fig. 4—Micro-Photograph of a Carbon Steel Tire at a Point Near the Center of the Section. Magnified 60 Diameters.

Should the test tire fail to meet the requirements in any particular, two more test tires shall be selected from the same heat if the manufacturer so desires, and at his expense. Should these two tires fulfill the requirements, the heat shall be accepted.

11. Tires when furnished in the rough shall conform to drawings with the following tolerances:

(a) Height of Flange—The height of flange shall not be more than 3-22 inch over or under the height called for. (b) Width of Flange—The width of flange shall not be more than 1-16 inch over or under the dimensions called for. (c) Throat Radius—The throat radius shall not be more than ⅛ inch greater nor more than 1-16 inch less than the radius called for. (d) Width of Tire—The width of tire shall not be more than ⅛ inch greater nor more than 1-16 inch less than the width called for. (e) Inside Diameter—The inside diameter shall not be less than the diameter of the finished tire by more than ⅜ inch. (f) Outside Diameter—Tires 33 inches or less in inside diameter shall be furnished in sets not varying more than 1-16 inch in outside diameters, and not out of round more than 1-16 inch. Tires over 33 inches in inside diameter shall be furnished in sets not varying more than 3-32 inch in outside diameter and not out of round more than 3-32 inch.

12. The manufacturer's brand and serial number shall be legibly stamped on the tire close to the inside edge where the stamping will not be cut off at the last turning. Set numbers shall be stenciled on each tire.

13. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the tires are being furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

14. Tires which show injurious defects while being finished by the purchaser will be rejected, and the manufacturer shall replace them at his own expense.

TABLE NO. 1.—COMPARATIVE PHYSICAL PROPERTIES AND CHEMICAL COMPOSITION OF HEAT TREATED CHROME-VANADIUM AND STANDARD CARBON STEEL TIRES.

	Physical Properties.				
	Heat Treated Chrome-Vanadium Tires.				
	Obtained.				Regular Carbon Tire.
Manufacturer	Standard	Midvale	Latrobe	Specified.	
Elastic limit, lbs. per sq. in.	119,500	110,000	118,700	110,000 to 125,000	65,000
Tensile strength, lbs. per sq. in.	146,500	136,000	149,520	140,000 to 160,000	125,000
Elongation in 2 in., per cent.	15.5	17.0	15.0	Minimum, 12	12
Reduction of area, per cent.	39.0	48.6	34.4	Minimum, 30	17
	Chemical Composition.				
Carbon, per cent.	0.55	0.57	0.62	0.50 to 0.65	0.68
Manganese, per cent.	0.64	0.694	0.62	0.60 to 0.80	0.70
Chromium, per cent.	0.88	0.95	0.95	0.80 to 1.10	0.00
Vanadium, per cent.	0.17	0.20	0.24	Over 0.16	0.00
Silicon, per cent.	0.30	0.289	0.27	0.20 to 0.35	0.250
Phosphorus, per cent.	0.034	0.037	0.015	Not over 0.05	Under 0.05
Sulphur, per cent.	0.04	0.023	0.028	Not over 0.05	Under 0.05

TABLE NO. 2.—SUMMARY OF RESULTS OF DROP TESTS OF HEAT TREATED CHROME-VANADIUM TIRES.

Maker	Standard	Midvale	Latrobe
Thickness	3 5/8 in.	3 7/8 in.	4 in.
Inside diameter before test	48 1/2 in.	55 5/8 in.	56 in.
Inside diameter after test	43 7/16 in.	50 1/16 in.	51 in.
Deflection required	4 7/16 in.	4 3/4 in.	3 11/16 in.
Deflection obtained	5 7/16 in.	5 1/16 in.	5 in.
Maximum drop	25 ft.	*40 ft.	30 ft.
Weight of drop	2,240 lbs.	2,240 lbs.	2,240 lbs.

*Entire test made at this height.

HIGH PRICE OF OIL FUEL IN AUSTRIA.—It is only a very short time ago that, at the instance of the petroleum producers of Galicia, the Austrian authorities agreed to have the locomotives on a considerable mileage equipped to burn oil. Now the price of oil has grown up so much that the Austrian government is preparing to change back to coal again on part of these engines.

TRAIN ACCIDENTS IN NOVEMBER.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of November, 1912:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
8.	Nashville, C. & St. L.	Emerson, Ga.	bc.	F. & F.	7	15
*†11.	Yazoo & M. V.	Montz, La.	rc.	P. & F.	13	30
†*13.	Cin. H & D.	Irvington.	bc.	P. & F.	15	24
14.	Texas & P.	Rosedale.	rc.	P. & F.	1	0
15.	Boston & Maine.	Fitchburg.	xc.	P. & F.	1	0
17.	N. Y. N. H. & H.	Putnam.	rc.	F. & F.	1	1
19.	Seaboard Air Line.	Granite.	bc.	P. & P.	8	14
23.	Texas & P.	Alexandria.	rc.	P. & F.	3	3
29.	Cin. H. & D.	Brownsville.	bc.	F. & F.	2	3

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
1.	Seaboard Air Line.	Rawlins.	malice.	P.	1	6
2.	Mo. Kan. & Texas.	Bonita.	b. rail.	P.	0	24
3.	New York Central.	Corning.	ms.	P.	1	1
15.	N. Y. N. H. & H.	Milford, Conn.	d. track.	P.	0	1
15.	N. Y. N. H. & H.	Green's Farms.	b. truck.	P.	0	17
19.	C. C. C. & St. L.	Anderson.	boiler.	F.	0	3
27.	Southern	Carrollton, Miss.	cow.	F.	3	2
†27.	Penn	Glen Loch.	(Note)	P.	4	49

In the butting collision between a freight train and a work train at Emerson, Ga., on the 8th, seven employees were killed and 15 were injured, most of the victims being laborers on the work train. The foreman and the assistant foreman on the work train were killed, and two enginemen and two brakemen were among the injured.

The rear collision at Montz, La., on the morning of the 11th wrecked a northbound passenger train carrying a large number of excursionists. It was stopped on a curve and was run into at the rear by a following fast freight train. There was a dense fog at the time and the rear trainman of the passenger went back only about 1,100 ft. This collision was reported in our issues of November 15 and 22.

In a butting collision between a westbound passenger train and an eastbound freight, on the Cincinnati, Hamilton & Dayton at Irvington, Ind., five miles east of Indianapolis, at 3 o'clock on the morning of November 13, 15 persons were killed and 24 injured. The wrecked passenger cars took fire but, according to the reports, the flames were extinguished before any persons were burned. The collision was occasioned by a misplaced switch, the responsibility for which is placed on the men in charge of the freight train.

In the rear collision at Rosedale, La., on the morning of the 14th, a freight train ran into the rear of a preceding passenger with such force as to crush the passenger car for about 15 ft. of its length. This was a sleeping car. The fireman was killed.

In the collision at Fitchburg, Mass., on the evening of the 15th, eastbound passenger train No. 2 ran into a light engine near the station. An employee riding on the light engine was fatally injured, as was also the fireman, probably. A few passengers were slightly injured.

In the rear collision of freight trains at Putnam, Conn., on the morning of the 17th, one trainman was killed and another was injured. The engine, caboose, and 8 freight cars were damaged. The leading train was not properly protected by flag.

The trains in collision at Granite, N. C., on the 19th, about 4 a. m., were southbound express No. 81 and northbound express No. 84. Both engines and the baggage and express cars of both trains were wrecked, the trains having been running at pretty high speed. The persons killed were both enginemen, both firemen, two express messengers, a porter and two trainmen off duty who were riding on the northbound train. Six passengers and six employees were injured. The cause of the collision was disobedience of a meeting order on the part of train 84. This order was delivered to the train at Norlina, seven miles back.

In the rear collision at Alexandria, La., on the morning of the 23rd, about 4 o'clock, a westbound passenger train ran into the rear of a preceding freight. One engineman, one fireman and one brakeman on a freight engine at the rear end of the freight train were killed and three other trainmen were injured. The freight train had been stalled near the station and two engines, without trains, behind it, came up and were coupled into the freight to assist it. Soon after they had coupled to the train and started they were run into by the following passenger train. There was a dense fog at the time. The responsibility for the collision is placed on the men in charge of the second pushing engine, who should have protected themselves by flag.

In the butting collision of freight trains near Brownsville, Ind., on the 29th, one engineman and one fireman were killed and three other trainmen were slightly injured. The eastbound freight, an extra, had received an order to meet the westbound at Brownsville, but passed the station at full speed, the men forgetting the order. Both engines and eight cars were wrecked.

The train derailed near Rawlins, Va., on the afternoon of November 1, was northbound passenger No. 66. Two express cars were overturned and a messenger was killed; and four passengers and two employees were injured. The derailment was caused by a bolt placed on a rail, presumably with malicious intent.

The train derailed near Bonita, Tex., on the 2nd, was southbound passenger No. 41, and all of the passenger cars were overturned. Twenty-four passengers were injured, none very seriously. The derailment was due to a broken rail.

The train derailed at Corning, N. Y., on the night of the 3rd was a southbound passenger. It ran over a misplaced switch and into a side track, and the locomotive was overturned and fell down a high bank, lodging in the Chemung river. The fireman was killed and the engineman injured.

The train derailed at Milford, Conn., on the morning of the 16th was the westbound Portland express. Four rear cars of the train of 12 cars were derailed, the one next to the last car in the train fouling track 1, on which an extra freight train was passing. This car was slightly damaged by the freight. The cause of the derailment was the giving way of a base plate under a frog, due to a concealed fracture. One passenger was slightly injured.

The train derailed at Greens Farms, Conn., on the evening of the 16th, was the westbound "Merchants Limited" Express. The derailment was caused by an equalizer bar breaking on the left forward truck of dining car, which bar caught in a trailing crossover switch, derailing the dining car and the three cars following. The cause of the breakage of the equalizer bar is undetermined. Inspection showed it was a new break and so located as not to be detected by ordinary inspection.

The train derailed at Carrollton, Miss., on the 27th at 1:30 a. m., was a westbound through freight drawn by two engines and running at considerable speed. Both engines were overturned and ten cars were wrecked. Both enginemen and one fireman were killed and two trainmen were injured.

In the derailment at Glen Loch, Pa., on the 27th, two passengers and two sleeping car conductors were killed and 49 passengers were injured. This accident was probably due to a bridge failure. It was reported in the *Railway Age Gazette* of December 6 and 13.

[1]Abbreviations and marks used in Accident List:

rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

NEW ARGENTINE EXTENSION PROPOSED.—Lacroze Bros., Buenos Aires, have asked authority from the Argentine congress to extend the Buenos Aires Central from Rojas to Cordoba and to lay a third rail throughout, thus opening up communication with Buenos Aires to the narrow-gage railway system of northwestern Argentina.

Maintenance of Way Section.

IN order to give a prompt and complete report of the ninth annual convention of the American Wood Preservers' Association which meets January 21-23, 1913, inclusive, the January maintenance of way section will appear in the issue of January 24, instead of in the third issue of the month, that of January 17. In this way it will be possible to give promptly a full account of the discussions on the floor of the convention as well as of the reports presented.

THE importance of a well laid out and operated material yard is becoming more generally realized as opportunity is afforded to study the subject. Not only must the arrangement be such that any material can be secured quickly in case of an emergency, but it must also be possible to handle the material economically in daily routine work. Great improvements have been made in many yards in recent years and descriptions of the methods of laying them out, the equipment, if any, which is installed, the method of operation and the force required at such yards will be of timely value. We desire to bring out as many such descriptions as possible in the contest on the "Storing and Handling of Maintenance of Way Material," which closes on December 25. Contributions will be received describing material handled either by maintenance or storekeepers' forces for the maintenance of way department. Descriptions of any method of handling material in any branch of the maintenance of way field will come within the limits of this contest. We will pay $25 and $15 for the best two papers received and will pay our space rates for all other contributions accepted and published. All contributions must be received by the Civil Engineering Editor, *Railway Age Gazette,* Transportation Building, Chicago, by December 25, in order to be considered by the judges of the contest.

THE articles on the Hindoo as a track laborer on another page conclude the series of discussions of the various nationalities commonly employed in track work, which have been appearing in these columns for the past seven months. Like the Japanese, discussed last month, the Hindoos are now found only in the West, and as shown in these papers they compare unfavorably with the Japanese. Chinese laborers are also employed to a limited extent in the Pacific coast states and are found in much greater numbers north of the Canadian border. During last July approximately 1,500 men were employed on extra gangs on that portion of the Canadian Pacific between Vancouver, B. C., and Kamloops, of which 40 per cent were Chinese and 10 per cent. Japanese. On this same line 17 per cent. of the regular section forces were also Chinese and 5 per cent. Japanese. While the Hindoos are not regarded very favorably as track laborers the Chinese make good workmen, and it is commonly said in the west that, dollar for dollar, they are as good as white men, especially since white labor in that part of the country is much affected by labor agitation and organizations. The present scarcity of labor, which gives every indication of increasing next year, raises an interesting question regarding the possibility of reducing the restriction of the entrance of these Asiatic races to this country in the near future as a solution of the labor problem. This possibility is now being given serious attention by a number of prominent railway men, and while it is probable that such a move will meet with the active opposition of organized labor, it is difficult to see how such labor admitted in limited numbers will compete with any labor except the south European unskilled labor which at the present time is generally employed.

THE cleaning of stone ballast is a necessary, and at the same time an expensive operation which must be done at regular intervals, the frequency depending on local conditions. As soon as stone ballast is placed in the track it begins to collect cinders and other material in the voids until these spaces are filled and the drainage greatly impaired, if not altogether cut off. As drainage is essential to well maintained track the stone must be cleaned to remove this material, this cleaning costing about $345 per mile of single track annually, according to the figures given by Mr. Lindsay on another page. A large part of this expense is avoidable and can be prevented by proper supervision. Most of the material clogging up the ballast consists of cinders dropped from defective ash pans, and from ash pans opened by firemen. Nor is this the only damage resulting from these causes, for many ties are destroyed by the hot cinders, and this dumping of live coals is a frequent cause of the burning of timber bridges. On one trip recently on the main line of a prominent eastern road, 25 burning ties were observed within less than 100 miles. The difficulties due to the clogging up of ballast as well as to fires have increased since the federal regulations regarding the self-dumping ash pans have gone into effect, and the increase in fires on timber trestles has been widespread. These effects can, however, be greatly reduced by a careful inspection of the ash pans before the locomotives leave the terminals. Likewise, the deliberate dumping of cinders along the track can be closely regulated by proper disciplinary measures. An examination of 100 miles of a busy single track road recently showed the ballast to be nearly as clean as when put in two years ago, in marked contrast to conditions on other divisions of this same road and on other roads. An investigation showed that local officers watched the dumping of cinders along the track very closely. While it is difficult to detect offenders in all cases and to properly discipline them, the differences found in conditions on different divisions of the same road and on different roads, indicate plainly that decided improvement can be made on many roads. The high annual charge for removing these cinders from the track is sufficient to justify close attention to prevent them from being placed there.

IN the midst of the arguments regarding the relative merits of the various processes of treating ties and the extent to which such treatments should be applied, the fact remains that the condition of the wood to be treated as regards decay is more important than the nature of the treatment itself. While no one would knowingly treat ties in which decay was well advanced, this is being frequently done, and undoubtedly was more frequently done in past years. The difficulty is to determine the presence of decay in all its forms and there has not been as much study of this matter as its importance makes desirable. It is unquestionably true that many early failures of treated ties which were charged against the process were rather a result of the use of wood in which decay was well advanced. Even now it is not uncommon for a tie to break when being handled after treatment, showing interior decay in an advanced stage, and many unsound ties are undoubtedly put in the track without their true condition being known.

The detection of some of the forms of decay is difficult, although marked progress has been made within recent years, due to the careful study of this subject in certain quarters, until now certain signs on the exterior of timber which were ignored a few years ago are known to indicate decay. This knowledge has not advanced sufficiently, however, to enable inspectors to detect all unsound wood, and ties are undoubtedly passing them which should be discarded. The treating plant of the Central Railroad

of New Jersey and the Philadelphia & Reading, at Port Reading, N. J., has installed cutoff saws in connection with its adzing machine, which remove about one-half inch from each end of the tie to uncover the interior wood and to permit the detection of unsound ties which have passed the inspectors. While the officers in charge of this plant believe that their inspection is much closer than the average, the ties being inspected on receipt at the plant, where proper facilities are provided, rather than at some distant point, enough unsound ties are detected by the saws to justify their use. While many treating men think this an unnecessary refinement, it is at least on the side of definite knowledge, and past experience would lead one to believe it to be justified.

All of this reverts to the methods of manufacture of the timber. The study and detection of decay are but incidental to its prevention, and it would seem that some method should be worked out whereby the storage of ties while awaiting shipment would be under the supervision of a competent inspector. After the causes of the different forms of decay had been learned proper means could be adopted to prevent them. Under the conditions existing now, ties are cut and piled by men who know little about these problems, and when purchasing ties the railway must rely upon the inspector who examines them hurriedly for external evidence of decay as they pass before him and who knows nothing of the conditions under which they were manufactured and stored. With the cost of ties and treatment both increasing as they are, and in view of the fact that each decayed tie treated is a loss of both tie and preservative, it is well worth careful study to prevent, as far as possible, the starting of this decay and to insure its detection.

THE AUTOMOBILE IN RAILWAY CONSTRUCTION.

THE use of motor cars for inspection purposes and for carrying small gangs engaged in maintenance work is proving economical on many roads, the saving in time of those using the cars more than offsetting the higher first cost and the added cost of fuel and maintenance. An article on another page of this issue shows that a similar substitution of automobiles for horse-drawn vehicles in the inspection of a new line under construction also resulted in economy in spite of the higher cost per hour for the automobile. These figures are based on results obtained when the automobiles are rented; and, as suggested by the author, even greater economy might be shown if the company owned and operated its own cars. In addition to increasing the saving, the owning of such cars has other advantages. When facilities are available for quick trips, inspections will be made more frequently than when it is necessary to hire a livery rig for each trip; and frequent inspection is always an advantage. An automobile can be used to take out new men for the resident engineers' parties and to transfer these men from one party to another to handle temporary emergency work rapidly. It can bring small parts for the repair of instruments and contractor's machines, which in some cases may prevent delay to a portion of the work. It can be used to collect road commissioners or members of village boards to see some road crossing or piece of property about which a dispute has arisen. Such a treatment of local authorities does much to facilitate the work of building a line by securing prompt settlement of controversies and helps maintain good feeling among the residents, which is an important asset for the completed road.

Although the practice of supplying automobiles to engineers is not general, or even common, it is being followed in some cases. On one large terminal job the company has bought two machines for the use of its engineer. On another large piece of suburban line work the engineer in charge was furnished an automobile which enabled him to reach any portion of the work in less than half the time required on electric cars. An eastern road which is carrying on extensive line revisions provides its construction engineer with an automobile to enable him to get over the work quickly. In some cases where the railway company does not supply an automobile the engineers themselves own their cars, the company paying for their use. One division engineer on a central road in charge of 60 miles of new construction bought a four-passenger car under an agreement with the company that, in view of the advantage the car was to him in handling the work, it would pay the total upkeep bill, including fuel, oil, garage storage, renewals and repairs. As it was only necessary to cover the line once or twice a week, there were many days when the machine was not needed, and by an arrangement with the garage manager the car was often rented for special trips, the revenue from this source during the year that the work was under way being almost enough to cover the depreciation in the value of the car when it was sold again. By this arrangement the division engineer was able to keep his headquarters in a small city at one end of the line rather than in a temporary camp, which would otherwise have been necessary. The cost to the company was no greater than would have been the livery bill if he had hired a team for each inspection, and the inspections were made more frequently and more effectively than would otherwise have been the case.

Large contractors are quite generally providing their own automobiles and using them to get over their work when conditions make this possible. One contractor has found that on work scattered over a considerable distance he can eliminate several timekeepers by giving one man a motorcycle and letting him cover all the work. Motorcycles have also been used to a limited extent by resident engineers, in most cases the men owning their own machines.

The use of large power-driven vehicles such as motor trucks and traction engines is not uncommon among contractors who find it difficult to get teaming done at reasonable rates. It is quite frequently the case that the boom which precedes the building of a new railway in a rural community so inflates the price of labor that supplies cannot be hauled in at a reasonable cost. In a remote section in one of the southern states where farmers had been glad to get $2 a day for hauling sand or building materials before the new railway was projected, the contractors found it impossible to get a team for less than $4.50 a day when they wanted to get materials in to the line. In some cases this increase in price is probably justifiable from the farmers' standpoint, for when extremely heavy material such as concrete culvert pipe in large sizes is to be hauled the light wagons usually used in the country are not strong enough, and especially on hilly roads such work is very wearing on the teams. Under these conditions it may not only be cheaper but more expedient and sometimes necessary to use a large motor truck or traction engine. With the latter it is sometimes possible to haul a string of ordinary wagons loaded with concrete materials or camp supplies and in some cases contractors have taken in narrow gage dump cars by setting them up at the siding where they were unloaded and pulling them in strings of 10 or 12 over the dirt roads. A motor truck has the advantage of speed over the traction engine, but in rough unbroken country at a distance from large towns break-downs are apt to be frequent and repairs difficult and slow.

NEW BOOKS.

Smoley's Parallel Tables of Logarithms and Squares. By Constantine Smoley, C. E., Principal, School of Civil Engineering, International Correspondence Schools. Seventh edition, 502 pages, 5 in. x 7 in. Bound in leather. Published by the McGraw-Hill Book Company, New York. Price, $3.50.

The new feature of this edition is a diagram by means of which right triangles of comparatively small dimensions may be solved almost at a glance. The results are sufficiently accurate for most practical purposes, and in other cases will serve as convenient checks. The book is designed for engineers, architects and students, and among others includes tables of angles and logarithmic functions corresponding to given bevels; common logarithms of numbers; and logarithmic and natural trigonometric functions.

Letters to the Editor.

A COMBINED MAINTENANCE ORGANIZATION.

LITTLE ROCK, Ark., November 20, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

With reference to Mr. Bremner's article on page 525 in the issue of the *Railway Age Gazette* of September 20, 1912, some instances have recently been brought to my attention which may be worth mentioning.

A single track road of light traffic maintained a crossing with a double track road handling a heavy traffic. This crossing was found to be going to pieces and the section foreman was called to task. He explained that his forces had recently been increased to permit him to renew some ties in a piece of track which was in bad condition. As he did not have a man that he could leave to do this work, he did not consider it advisable to stop the entire crew to repair this crossing.

In another instance the gravel had washed away in front of a doorway at a station, leaving the lower step in a dangerous condition. The master carpenter instructed his foreman to fix this as he passed the station, but the crew was pushed for time and neglected it. An elderly lady fell and was seriously injured. The railroad company settled the case out of court for $300.

At another place, while unloading heavy freight at a combination depot, a heavy package broke a hole in the floor of the platform. The agent repaired it as best he could by nailing some pieces of inch boards over the hole and notified the master carpenter. While getting off a passenger train at night, a lady tripped over this and was so seriously injured that the claim agent considered himself fortunate in being able to settle the case for $2,500.

Again, a cattle guard was damaged by a broken brake beam and the section foreman repaired it as best he could, reporting the trouble to the master carpenter. A steer was caught in this cattle guard, causing the derailment of the engine, the injury of the foreman and considerable damage to several cars and their contents.

All the above cases occurred on one 400-mile division within five months' time and resulted in loss to the company. The following instances showed the undue cost to the railway company of doing things in the ordinary way:

A section foreman succeeded in securing some cinders and raised a yard track in which there was a small opening on wood blocks which had to be raised with the rest of the track. To do this a crew of six men rode two hours on a passenger train, worked two hours, killed two hours' time and spent two hours riding back. They also lost practically two hours more about the boarding cars.

In another case a pane of glass was broken in a small depot. The glass cost 30 cents. A man had to be sent from the nearest crew to put in the glass, requiring about three-fourths of a day, of which the actual work of replacing the glass took about 30 minutes.

Again, a track scale refused to work and the agent wired for a scale man. It so happened that the man had to spend an entire day on the road, reaching the location after dark, and the returning train left before daylight next morning. When the repair man reached the scale, he found that the end of a cane had been driven in between the wall and platform by some mischievous person and it required about a half minute to remove it when located.

These instances are cited to show that our present organization is now divided between four different departments, track, bridge, line and scale, each of which does both maintenance and construction work. Why not separate along natural lines and allow the section forces to do police and repair work of all kinds, while the rebuilding is done by extra gangs. It is often hard to secure men who are willing to work in section gangs when it is desired to increase them temporarily for renewal work, while it is usually easy to recruit a larger crew. The section foreman will excuse neglect of attention to minor details as the foreman did about the crossing. If reprimanded for not getting in enough ties, he always has the excuse of having to go over his section doing odd jobs. If each section crew had one man in it able to repair a platform, adjust a scale and attend to minor signal and line work, and if each section was supplied with material for these minor repairs, the loss of time riding trains could be eliminated. The heavy repairs and rebuilding could then be done by skilled crews, especially trained for their work. If one has only to teach men to do one thing, he can easily make them skillful at that.

With such an organization no one plan would be best for all roads. Some lines could perhaps be handled by a section crew of one man with a velocipede. Others would need a larger force with a motor car. The organization of the larger gangs for rebuilding and renewal work would be governed by conditions. Would not this principle of the separation of the two classes of work tend towards efficiency and economy? The repair of small bridges, stations, telegraph lines and signals can be done by the same men who tighten bolts, adjust the switches, line the track and maintain the fences and crossings. While the rebuilding of bridges, the renewal of stations and platforms, the masonry work, line and signal work and the installation of scales are special problems the same as the renewal of ballast and rails.

A. M. VAN AUKEN.

THE OLD WAY AND THE NEW.

DULUTH, Minn., November 8, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

F. S. Stevens' letter in the *Railway Age Gazette* of October 18, 1912, under the title of "Equating Mileage of Track Sections" is of much interest, as it expresses, from the point of view of the track maintainer, that which has been growing in the minds of men in various fields of endeavor during recent years; viz., a demand for exact knowledge concerning all details of their business, and of the value of work performed by their employees.

Efficiency and scientific management have become household words with us. It is well to ask ourselves, however, if they have become anything more. Are railways better managed for this efficiency propaganda? Are we really progressing in the science of management? I venture to say that we are, that we must. But I venture also to say that, although this new method of extracting the most from a dollar is within our reach, we are seemingly slow to grasp it. There are reasons for this apparent reluctance. "Large bodies move slowly" and start more slowly still. The management of a railway system is a large body when considered in the broadest sense, for each employee and foreman is an essential portion of the management. The management can no more do without the employee's brain and his records than without the auditor's brain and his records.

Unless the reports compiled for the general officers are based on information obtained from the employee and of his work, then those reports are mere guess work and worse than valueless.

Scientific management must be built up from the bottom. Its broad foundation is of correct data concerning the results obtained by and from its working unit, the laborer. In no other way is it possible to manage any enterprise properly, correctly, scientifically.

It has been argued, and with truth, that the railways of this country are as well managed as are commercial enterprises. Considering the number of great railway systems covering territory similar, overlapping and interlacing; considering the similarity of the business conducted by the different companies and their opportunities for comparisons of methods and results, should not the railways of this country be better managed than the average commercial business venture? Undoubtedly there is room for improvement all around.

Apropos of the equating of track sections, Mr. Stevens naively

states that "to do this accounts must be kept." The closer one examines into the matter of scientific management, the greater respect he gains for that sentiment. The fact that this accounting must all begin with and depend on the records of the "man lowest down" inclines us at first to despair. But there is no cause for fear. The "man lowest down" responds nobly to this as to other calls on his resources. It is up to the management to make the effort. The fault, if fault there is, cannot be laid at the employee's door. Lay your plan plainly before him and he will not fail you. The very fact that he is to know what he spends of the company's money, as compared with his fellow employees, stimulates his interest, gives a zest to his work and changes blind faithfulness into intelligent effort. How may a man save money for a company when he knows little or nothing of the value of the material he uses, when he has no means of judging whether he is extravagant in comparison with others doing similar work? Why not put before him comparisons of true values, and thus transform him from a mere machine into a thinking unit of live business ability?

To know the value of a building, a coal station, a bridge, a mile of track, the cost of the labor expended and the materials used in each detail must be obtained from the foreman in direct charge of the laborers performing the work and using the materials. This necessitates the most exact daily reports by the foremen, who must in turn depend to some extent on their laborers for the information. These reports from the various sources, when tabulated and combined, form the basis of the statements made to minor and to general officers and boards of directors.

Let us know what we profess to know. Let us inform ourselves. The management of a railway is efficient in so far as its officers are thoroughly conversant with the values of the actual services performed under their jurisdictions and no further.

But it is often argued that no man can know all the details of the various branches of the railroad business. Is this any excuse for not trying? It seems the plain duty of each person in railway employ to educate himself as thoroughly as possible in the many details relating to railways, while giving attention also to his routine duties. These things can and are being done. This responsibility for self-education increases enormously as the individual rises in the service and attains to a wider official horizon. To learn all details may be impossible. To cease to study them is inexcusable and a mark of the limit of usefulness.

The responsibilities of the railway officer do not cease with the performance of his routine duties, nor with his study of railway details. It is likewise incumbent upon him to insist with all necessary persistence that each man under him shall do his part, in keeping such records as his position requires and in obtaining and furnishing to his superior officers such information as will be of value in the scientific management of the stockholders' property.

If there be individuals in railway employ incapable or unwilling to enter with enthusiasm into this quest after values, they are not worthy the consideration of their officers, nor of the money paid them for their services. The day of unscientific effort is past. The epoch of research in connection with the "daily grind" is at hand. The brain is best trained through the experience of the hand. "The man highest up" and "the man lowest down" must join hands in this endless chain which moves the machinery of efficiency. Railways so manned will pay where others fail. This is a question of the survival of the fittest.

E. R. Lewis,
Assistant to General Manager, Duluth, South Shore & Atlantic.

Maintenance of Way Bulletin.—The complete proceedings and discussion of the 1912 convention at Buffalo are contained in the November issue of the Maintenance of Way bulletin of the Roadmasters' and Maintenance of Way Association, which has just been issued.

ABSTRACT OF ENGINEERING ARTICLES SINCE NOVEMBER 15.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the regular weekly issues of the *Railway Age Gazette* since November 15:

Progress on the Grand Central Terminal.—Although everyone has heard of the extensive terminal development which is nearing completion by the New York Central in New York City, there have been very few comprehensive descriptions of this work. The unusual features encountered on the work, of which there were many, are described and illustrated by photographs and track layouts in the issue of November 22, page 981.

The Production of Sound Steel Ingots.—The abstract of a paper by Benjamin Talbot, an English metallurgist, advocating the compression of an ingot while the center is still liquid in order to prevent piping and segregation, was published in the issue of November 22, page 991. An editorial comment on this subject appeared on page 975 of the same issue.

Fairbanks-Tucson Extension of E. P. & S. W.—The El Paso & Southwestern has completed an extension from Fairbanks, Ariz., to Tucson, which is very important from a traffic standpoint and on which the standards of construction are high. An illustrated description of this work was published in the issue of November 29, page 1031.

Crossovers in High Speed Passenger Tracks.—An editorial discussion of this subject which has been given so much publicity recently on account of two wrecks on the New Haven, due to excessive speeds through crossovers, was published in the issue of December 6, page 1074.

The Hopatcong-Slateford Cut-off.—One of the heaviest pieces of railway construction ever carried out in this country is the cut-off of the Delaware, Lackawanna & Western from Lake Hopatcong to Slateford Junction. An article written by C. W. Simpson, resident engineer of this work, which describes very clearly the general features of the line and the handling of the excavation, appeared in the issue of December 6, page 1091.

Titanium Rails.—A description of the action of titanium as a scavenger in the ladle before pouring steel, and a summary of results secured with titanium rails in service, was published in the issue of December 13, page 1141.

Unit System of Subway Construction.—While the building of concrete slabs for subways and trestles has been more or less common, the first attempt to build the columns and cross girders in a concrete yard and place them in units, which has been done on the Kansas City Terminal, is described by A. R. Eitzen, office engineer, in the issue of December 13, page 1133.

ANNUAL TRACK INSPECTION ON THE QUEEN AND CRESCENT.

The annual track inspection of the Cincinnati, New Orleans & Texas Pacific and the Alabama Great Southern between Cincinnati, Ohio, and Meridian, Miss., was held on November 12, 13 and 14, 1912. According to the announcement made by Horace Baker, general manager, the first prize of $75 for the best track on a supervisor's district was awarded to S. McPherson, Stearns, Ky., while J. Bradley, supervisor at Somerset, Ky., was awarded second prize. M. Dyer, section foreman at Springville, Ala., was awarded first prize of $50 for the best individual section on the Alabama Great Southern and an additional prize of $10 for having the best section on the entire line. The second prize of $25 on the Alabama Great Southern went to B. H. Wright, section foreman at Valley Head, Ala. The first prize of $50 for the best section on the Cincinnati, New Orleans & Texas Pacific was awarded to N. Strunk, of Winfield, Tenn., and the second prize of $25 to J. Correll, of Coulterville, Tenn.

Demurrage in Germany.—The German Railway Union has long had regulations for the interchange of cars providing for a mileage charge and a per diem charge. But the regular per diem charge was only for what was considered a reasonable time, and there was a penalty for keeping the car longer. It has recently been decided to make this penalty 50 cents per day for the first half of the year and 75 cents per day for the second half, when, as here, there is likely to be a car shortage. The capacity of the cars is 22,000 to 33,000 lbs. each. This would be equivalent to about $2.50 per day for one of our 40-ton cars in the last half of the year. This new regulation is to begin January 1 next, and last for two years.

PROLONGING THE LIFE OF CROSSTIES.

Discussion of Methods That Are Calculated to Prevent Destruction of Cross Ties by Decay and by Mechanical Wear.

Three phases of the subject of prolonging the life of crossties are treated in bulletin No. 118 of the Forest Service, United States Department of Agriculture, by Howard F. Weiss, assistant director, Forest Products Laboratory, the data presented being gathered from previous publications of the service and many unpublished reports of field and laboratory tests. The subjects discussed are: First, treating the wood with chemical preservatives; second, protecting the ties from mechanical wear, and third, the use of sawed in place of hewed ties. The following is abstracted from the discussion of methods which the bulletin says can be used to reduce the annual consumption of crossties in the United States by at least one-half, resulting in an annual saving to the railways of at least $16,000,000. The present consumption of ties for renewals only requires the cutting of about 710,000 acres of timber land averaging 5,000 board ft., or 150 ties per acre. This amount of wood is equivalent under present conditions to the annual growth on about 55,000,000 acres of forest.

TREATING WITH CHEMICAL PRESERVATIVES.

In preparing ties for treatment, the first step in the process is to remove all bark. The two photographs reproduced herewith illustrate the result when the bark is not thoroughly removed. In one the tie was slabbed on two sides only, allowing the bark on the unslabbed sides to remain during seasoning. When this bark was removed and the tie treated there was very little penetration except in the V-shaped zones under the slabbed sides. In the other a strip of bark ¾ in. wide and as thin as paper absolutely prevented the entrance of creosote and resulted in a strip of untreated wood from the surface to the center. The best time to peel ties is an economic question which must be determined for each particular case. As a rule, it is good practice to remove the bark as soon as possible after the ties are cut, and to regulate the rate of seasoning by methods of piling. In this way peeling will be easier, there will be less danger from insects, and seasoning will be more rapid.

There are three methods of seasoning, namely; by air, by steam and by oil. Air seasoning is the best if conditions will permit its use. Three considerations are important in air seasoning; (1) the kind of wood; (2) temperature and circulation of air, and (3) manner of piling. In general, coniferous woods, such as pines, firs and spruces, season faster than many harder woods, and because of their more uniform structure are easier to dry and can be piled more openly without danger of serious checking. The warmer and drier the air and the greater its circulation, the more rapid will be the loss of moisture from the ties. In piling ties for seasoning, different methods are required for different kinds of wood and climate. The closer the ties are piled the slower will be their loss in weight. In no case should more than two ties in a pile come in contact with the ground. The most open form is the triangular one, which can be rapidly made and is well adapted for use along the right of way. It should not, however, be used for hardwoods cut in summer, since these will check badly. Good forms of piles are the 7 by 2, 7 by 1, and 8 by 1. These are well adapted for softwoods and most hardwoods cut in summer. They are easy to build and permit of free circulation of air. When it is desired somewhat to retard the rate of drying, the 8 by 2 or the 10 by 1 form should be used, or if these are still too open, the 7 by 7 form. An advantage of the 7 by 1, 8 by 1, 10 by 1, and similar forms is that no tie lies flat on another, thus giving an easy run-off for rain water and a free circulation of air. In practically no case should untreated ties be piled solidly 9 by 9, since such forms are exceedingly inefficient in regard to seasoning and invite decay.

Seasoning by steam is not as common today as it was a decade ago. Perhaps the chief reason for this is the better knowledge that now exists as to the causes of decay and the effect of steaming on the strength of wood. Pioneers in wood preservation held that to prevent rot it was necessary to coagulate the albumen in the wood, and that steaming did this. Later investigation has shown that the amount of albumen in wood is inappreciable. Moreover, the poor heat conductivity of ties makes it necessary to subject them to a steam bath for at least 4 to 8 hours before the interior temperature reaches that of the outside. This means, of course, a large consumption of steam.

Steaming does not, as believed, dry out the sap and moisture of the ties and render them thoroughly dry. On the contrary, it increases their moisture content. This may hold true for green as well as air-seasoned ties. In order to decrease the weight of ties a final vacuum must be drawn. This lowers the boiling point of the water in the wood, causing it to evaporate quickly. If the steam pressures used are too high, or of too long duration, or if the evaporation of the water from the wood is too rapid, serious decrease in strength will result. Steaming undoubtedly carries with it a danger of injury to the wood, but when some quick artificial means of seasoning ties must be used, steaming at low pressures not to exceed 30 lbs. followed by a vacuum of 25 to 26 in. may be employed.

While steam seasoning increases the weight of ties and necessitates the drawing of a vacuum to get the sap and water out of them, seasoning in oil produces the opposite effect, since the ties constantly lose moisture while in the hot bath, and no vacuum is required. It is likely that the greater the moisture content of the ties boiled in oil, the greater will be the decrease in strength. Ties partially air seasoned, therefore, will check less during treatment than those thoroughly green.

The immersion of freshly cut ties in water has been shown by tests to cause them to season more rapidly at first, but their total loss of moisture is no greater than it would have been without the immersion. The importance of grouping the ties in the treating cylinder to secure uniform treatment has been frequently commented on and cannot be over-emphasized. The chief factors in such grouping are: (1) the species of wood; (2) per cent. of sap and heartwood; (3) moisture content. The characteristics of the wood structure which apparently exert a marked influence on the absorption of preservative are: (1) the "pores" or vessels; (2) tyloses; (3) the resin ducts and cells; and (4) the composition and density of the cell wall. A careful study of the various species is necessary to determine the best grouping on the basis of these characteristics.

In the operation of the treating plant the two essentials are (1) to secure a uniform treatment for all ties which is best accomplished by the proper grouping of the ties and (2) to secure a thorough diffusion of the preservative in each individual tie. A simple but effective rule for the latter is to insist upon the complete penetration of all sap wood. Each of the various manipulations of the plant during the treating process affects the distribution of the preservative in the ties. A preliminary vacuum drawn in the treating cylinder decreases the resistance to the entrance of the preservative into the ties, and so enables the operator to secure the desired absorption in a shorter time than otherwise. With light injections the absorption in ties so treated will tend to vary more than when no preliminary vacuum is used. Ties offering least resistance may take most of the preservative, while those most resistant may get very little of it. In heavy injections, where the ties are treated to refusal, the tendency of the preliminary vacuum to

produce erratic absorption is not so pronounced, and its use will be found of considerable assistance.

Most tie-treating specifications call for a pressure on the preservative varying from 100 to 175 lbs. per sq. in. until the desired amount has been forced into the wood, but few if any of them specify the rate at which this pressure should be applied. Pressures applied rapidly tend to produce erratic results in absorption similar to those caused by the preliminary vacuum in light treatments. The most uniform distribution is secured by applying the pressure gradually. A good way to do this is to hold the pressure temporarily at 75 lbs. per sq. in., and increase it in steps of 25 lbs. every 15 minutes until the pressure or absorption desired is obtained. Such a procedure may require a longer pressure period, but the results secured in light treatments will fully warrant it.

After the ties have been impregnated a common practice is to drain the cylinder and apply a final vacuum. This is done to dry the surface of the ties, and sometimes, in addition, to remove some of the preservative that has been forced into the wood.

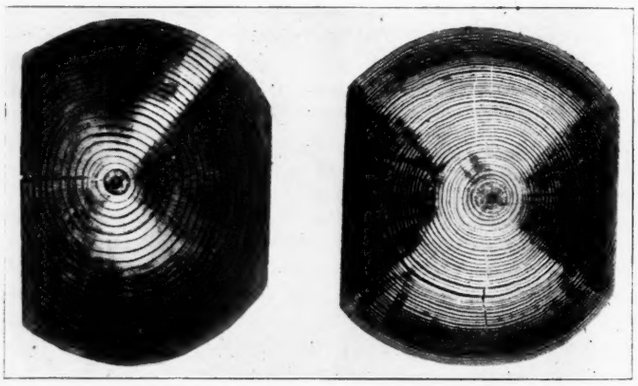
Measuring the absorption of preservative may be subject to serious error, which, if not provided against, is more than likely to result in an unsatisfactory preservative treatment. There are six possible causes of errors in measuring the absorption. First: it is difficult to measure the exact volume of the charge. This is sometimes done by subtracting the volume of the oil pumped into the cylinder before pressure is applied from the total volume of the cylinder minus the known volume of the tie buggies. This method is not accurate, however, since the ties absorb some of the preservative before the pressure is applied and an allowance must always be made for this difference. With sawed ties the volume can be computed fairly accurately by using the standard size tie and multiplying by the number of ties in the charge. Second, the expansion of the creosote amounts to about 1 per cent. for every 22.5 deg. F. rise in temperature. It is usually run into the treating cylinder at about 200 deg. F., and its temperature invariably falls from 10 to 60 deg. when it strikes the ties. Unless the temperature of the creosote is brought back to the original value before any measurement is made this expansion will cause an error in result. Third, the expansion of the cylinder may amount to a very considerable item, due both to the expansion from heat and from the internal pressure. For a cylinder of ¾ in. steel 7 ft. in diameter and 132 ft. long this increase in volume may amount to 18 cu. ft., equivalent to an absorption of about 1,187 lbs. of preservative or 1.48 lbs. per tie in a charge of 800 ties. Fourth, under the pressure applied for treatment, the oil and wood may be compressed enough to affect the results obtained by volume measurements. At best, however, this can produce only an insignificant error, since creosote under ordinary operating conditions compresses less than 1/10 of 1 per cent., and the pressure on the ties is distributed, in part at least, through the interior structure of the tie and the theoretical compression will never be reached. Fifth, the most serious error is occasioned by the "kickback" of the preservative. When pressure is applied to a cylinder, the charge of oil, wood, and the air confined in the wood are under compression and the cylinder is under tension. If the pressure is released a certain amount of the preservative will be forced out of the cylinder, although it remains constantly full. The amount of preservative thus forced out will be called the "kickback." It varies with many conditions, and unless provided for may result in errors of measurement for absorption of from 10 to 40 per cent. The expansion of the wood may produce an error which will be opposed to the errors caused by factors mentioned above, and may be enough to offset the error due to one or more such causes. The extent of these possible errors is shown by the following example:

Assume the treating cylinder to be 7 ft. in diameter, 132 ft. long, and to hold a charge of 800 7-in. x 9-in. x 8 ft. ties; assume also that 10 lbs. of creosote per cubic foot are to be injected into and left in the ties; that a pressure of 175 lbs. per square inch is used during the treatment; that the oil in the measurement tank is maintained at 200 deg. F., and is injected into the wood at 180 deg. F.; and that the normal temperature of the cylinder and wood is 60 deg. F. With all gages working perfectly, no leaks of any kind occurring, all air out of the cylinder, when the oil pump is started, and the volume of the ties accurately known, the following errors may take place:

		Pounds per tie.
1.	Chargeable to contraction in the volume of creosote	1.85
2.	Chargeable to the expansion of the cylinder due to temperature	1.35
3.	Chargeable to the "kickback" (assumed to be 20 per cent. of the absorption)	7.00
	Total positive errors	10.20
4.	Chargeable to the expansion of the wood	1.50
	Total in excess of apparent absorption	8.7

Thus, out of a total specified injection of 10 lbs. per cu. ft., or 35 lbs. per tie, 8.7 lbs. per tie may be forced into the cylinder, but either will not go into or not remain in the ties, constituting a total error of 25 per cent. In plants operating with zinc chloride, item 1 may be eliminated and item 3 will be less than that given.

Fortunately, these sources of error can be guarded against by pumping the preservative from the cylinder back into the measuring tank from which it came, and applying the temperature correction to the oil. If the preservative is scattered in two or more tanks there is no good way of checking the absorption, but when it is taken from and returned to the same measuring tank in any one treatment, all that is necessary in order to ascertain the actual absorption is to subtract the difference in the height of the float before and after treatment, after applying the temperature correction to the oil at both readings. In all cases where gage readings are depended upon, the absorption should be determined in this way. It is probable that a system of weighing the preservative by having the measuring tank mounted on scales will prove preferable to one employing floats. With the former device no temperature corrections need be made and errors incident to the use of floats are entirely avoided.



Sections of Ties Treated with Creosote, Lighter Portions Showing Where Preservative Failed to Enter.

PROTECTING TIES FROM MECHANICAL WEAR.

The principal means of protecting ties from mechanical wear are the use of tie plates and some improved means of securing the rail. The tests made by the Forest Service show better results with flat plates than with plates having deep ribs or very long sharp prongs. In tests with diamond pointed spikes it was found that when the ties were not first bored they were almost invariably split by such spikes, but when they were driven in holes of proper size there was no difficulty in making them follow the holes and offer a satisfactory resistance to

vertical pull. The use of screw spikes has been experimented with by the Forest Service, and when the plates used with the spikes reinforced the head against lateral thrust, good results were shown.

SAWED VS. HEWED TIES.

The claim is often made that hewed ties are more durable than sawed ties because they shed water better. Nothing is known by the Forest Service to substantiate this impression. Even if untreated hewed ties should be more durable than sawed ones, this advantage disappears when the ties are treated. On the other hand, there are many serious objections to the use of hewed ties, and these will increase in importance in direct proportion to the number of ties treated with preservative. Chief among these objections are (1) unequal bearing afforded tie plates and rails; (2) lack of uniform volume, and (3) unnecessary waste of valuable material. With sawed ties the bearing over the surface is more uniform and rail cutting is considerably reduced. The introduction of tie-boring and adzing machines is doing much to improve the bearing of plates on the ties and should cut down mechanical wear appreciably.

Since tie inspectors offer no objection to, but rather favor, ties of greater dimensions than those specified, the tie manufacturer rarely hews a large log to the standard size. Thus the cubic content of hewed ties may vary from that of the uniform dimensions allowed to about twice the size specified.

To hew a tie necessarily entails an enormous waste of material. Based on actual field data the waste by hewing varies from 25 to 75 per cent. Logs 15 in. in diameter furnish, as a rule, only one hewed tie, but if sawed they furnish two. Whenever possible the tie hewer selects trees of about 12 or 14 in. in diameter. The waste of wood each year in the United States from hewing ties amounts to 285,000,000 cu. ft., a quantity equivalent to about 80 per cent. of the total amount of pulpwood used in the United States in 1909. This is an absolute waste, as it is not even used for fuel.

The total cost of treating ties can be divided into the following items: seasoning, labor, fuel maintenance, and fire chemicals. The majority of ties now treated in the United States are air-seasoned prior to treatment. The cost of this varies with the kind of wood, season of the year, and geographical location. In general, however, it ranges from about 0.75 to 1.5 cents per tie. Labor includes all forms necessary to the treatment, such as loading and unloading ties in the yard, and for the tie plant and superintendence. It also varies considerably, but is here taken at 6 cents per tie. Fuel is least in those plants which can use natural gas or oil and highest in those most remote from a source of supply, but ranges from about one-half to 2 cents per tie. On account of the corrosive action of zinc chloride, the life of a plant using that kind of a preservative is usually reckoned as shorter than that of one using creosote; consequently, its depreciation is greater. The total cost of maintenance, including this depreciation, interest on the investment, etc., will usually range from 1¼ to 2 cents per tie. Practically all of the ties now treated in commercial plants in the United States are injected with zinc chloride or with creosote, either alone or in combination. Only a few plants use preservatives like crude oil and mercuric chloride. It is customary to inject about one-half pound of dry zinc chloride per cubic foot of wood, although this varies at times from one-third to two-thirds of a pound. This salt costs from 3⅞ to 5 cents per pound. Creosote costs about 6 to 10 cents per gallon in large quantities. It is customary in tie work to inject from 5 to 12 lbs. of this oil per cubic foot.

With the above data the cost of tie treatment may be estimated. It should be borne in mind, however, that the figures given are general, and may not apply to all conditions. These values are placed rather high, in order to make the data on financial saving more conservative. Unfortunately, reliable records on the life of treated ties in the United States are very scarce, so that it is largely a matter of conjecture as to how long the various processes now on the market will extend the natural life of ties. Because of the lack of reliable data, nothing but estimates can be given concerning the life of treated ties in the United States. It is, believed, however, that the figures given in table I are conservative statements of what may be expected under normal conditions. Where figures are missing from the table, it means either that the woods referred to should not be treated (being either very durable in their natural condition or refusing to absorb preservatives), or that they are usually left untreated.

TABLE I.—ESTIMATED LIFE OF UNTREATED AND TREATED TIES IN THE UNITED STATES.

Species.	Estimated life (all ties properly tie-plated). Untreated. *Years.*	Treated with 10 lbs. creosote per cu. ft. *Years.*	Treated with 0.5 lb. zinc chloride per cu. ft. *Years.*
Black locust	20	..	..
Redwood	12	..	..
Cedar	11	..	..
Cypress	10	..	..
White oaks	8	..	..
Longleaf pine	7	20	..
Chestnut	7	14	11
Douglas fir	6	15	11
Spruce	6	14	11
Western pine	5	17	12
White pine	5	14	10
Lodgepole pine	5	16	11
Tamarack	5	15	11
Hemlock	5	15	11
Red oaks	4	20	12
Beech	4	20	12
Maple	4	18	12
Gum	3	16	11
Loblolly pine	3	15	10

TABLE II.—ESTIMATED ANNUAL SAVING DUE TO THE TREATMENT OF CROSSTIES WITH PRESERVATIVE AND THE USE OF TIE PLATES.

[In each case a charge of 25 cents per tie for tie plates and 15 cents for placement has been added to the cost of the tie, and is included in the computed annual charge.]

Species.	Estimated life. Untreated. *Yrs.*	Estimated life. Treated. 10 lbs. creosote per cu. ft. *Yrs.*	Estimated life. Treated. ½ lb. $ZnCl_2$ per cu. ft. *Yrs.*	Cost of ties. Untreated.	Cost of ties. Treated. 10 lbs. creosote per cu. ft.	Cost of ties. Treated. ½ lb. $ZnCl_2$ per cu. ft.	Annual charge in track. Untreated.	Annual charge in track. Treated. 10 lbs. creosote per cu. ft.	Annual charge in track. Treated. ½ lb. $Zn Cl_2$ per cu. ft.	Annual saving of treated over untreated ties. 10 lbs. creosote per cu. ft.	Annual saving of treated over untreated ties. ½ lb. $Zn Cl_2$ per cu. ft.
Black locust	20	..	..	$0.60	....	....	$0.080	.....	.....	.....	.....
Redwood	12	..	..	.53	....	....	.104	.....	.....	.....	.....
Cedar	11	..	..	.46	....	....	.103	.....	.....	.....	.....
Cypress	10	..	..	.41	....	....	.104	.....	.....	.....	.....
White oaks	8	..	..	.60	....	....	.155	.....	.....	.....	.....
Longleaf pine	7	20	..	.52	$0.89	....	.159	$0.103	.....	$0.056	.....
Chestnut	7	14	11	.44	.81	$0.61	.145	.122	$0.121	.023	$0.024
Douglas fir	6	15	11	.41	.78	.58	.160	.114	.118	.046	.042
Spruce	6	14	11	.49	.86	.66	.175	.127	.127	.048	.048
Western pine	5	17	12	.53	.90	.70	.215	.115	.123	.100	.092
White pine	5	14	10	.43	.80	.60	.192	.121	.129	.071	.063
Lodgepole pine	5	16	11	.46	.83	.63	.199	.113	.124	.086	.075
Tamarack	5	15	11	.41	.78	.58	.187	.114	.118	.073	.069
Hemlock	5	15	11	.33	.70	.50	.169	.106	.108	.063	.061
Red oaks	4	20	12	.45	.82	.62	.240	.098	.114	.142	.126
Beech	4	20	12	.36	.73	.53	.214	.090	.104	.124	.110
Maple	4	18	12	.45	.82	.62	.240	.104	.114	.136	.126
Gum	3	16	11	.52	.89	.69	.338	.119	.131	.219	.207

The following comparisons are based on the values given in Table II, these comparisons being, of course, subject to limitations of the character mentioned:

Untreated black locust is the cheapest tie that can be used, costing 8 cents per tie per year to maintain in service. The most expensive ties are untreated western pine, red oaks, beech, maple, and gum, costing respectively 21.5, 24, 21.4, 24, and 33.8 cents per tie per year to keep in service.

Except for red oak, beech, longleaf pine, and maple treated by the Bethell process, and beech treated by the Burnett process, untreated black locust, redwood, cedar and cypress are still the cheapest ties that can be used. On account of their increasing scarcity and cost, however, it is likely that this condition will not hold for long.

Almost without exception a treatment with 10 lbs. of creosote per cubic foot is in the end only slightly cheaper than a treatment that is made with zinc chloride, assuming, of course,

that the ties are adequately protected from mechanical wear.

The best results in the treatment of ties are secured with red oak, beech and maple. These ties when treated cost about 10 cents per tie per year to keep in service. The poorest results are secured from chestnut, spruce and white pine, their charge being over 12 cents per tie per year.

It appears that the prices now paid for ties to be treated need readjustment. Based on their intrinsic properties, red oak, beech and maple ties are undervalued, while chestnut, spruce and white pine are overvalued.

When black locust, redwood, cedar and cypress ties cannot be secured at the prices given in the table and other woods must be used, it is in all cases cheaper to treat them than to use them untreated. The annual saving per tie due to treatment varies from about 2 cents for chestnut to 22 cents for gum.

At 60 cents per tie untreated white oak is more expensive than any of the other naturally durable woods, since it costs 15½ cents per tie per year to maintain. Under the conditions assumed it is cheaper to use inferior woods that have been treated than to use white oak untreated. When tie plates may be omitted on the white-oak ties, however, the annual charge will equal about 12 cents per tie per year, which compares favorably with the charges against treated ties.

RECOMMENDED PRACTICE.

The information collected by the Forest Service during nine years of experimentation and observation furnishes, it is believed, sufficient data upon which to base a set of rules outlining good practice in increasing the life of crossties. A great deal of work remains to be done, and it will be a long time before the true worth of many of the processes now employed is known, but it is believed that the general recommendations here given, if followed, should make it possible to secure a longer life for wooden ties and a saving in the cost of track maintenance. The following are the rules:

The winter cutting of ties should be encouraged. It leaves the forest in better condition and the ties season with less danger of checking, insect injury and decay.

Preference should be given to sawed ties. These result in less forest waste and permit in general a more uniform bearing of the plate on the tie and the tie on the ballast. Moreover, more sawed ties can be loaded on a cylinder truck, thus decreasing the cost of labor in the preservative treatment.

As a general rule, all bark should be removed from ties immediately after they are cut. If, however, they caseharden or are otherwise injured they may be permitted to season with the bark on, but all bark should be removed before the ties are placed in the treating cylinder.

If ties are to be adzed or bored, this should be done before they are treated.

It is almost always cheaper and better to use treated than untreated ties. In localities where black locust, redwood, cedar and cypress ties are available it may be cheaper to use these untreated than to use treated ties.

In selecting ties for treatment, preference should be given to those which are hard and which absorb the preservative readily. Treated red oak, beech, maple and gum ties will give better service than treated chestnut, spruce and white pine ties.

Since the sapwood is just as strong as heartwood and much easier to inject with preservatives, ties with a large amount of sapwood, provided it is properly distributed, should be preferred in preservative treatment to those with little or none.

All ties should be thoroughly seasoned before treatment. Of the various methods of seasoning, air seasoning is preferred, because it is usually safer. If ties must be artificially seasoned, they should be heated at low temperatures and lose moisture gradually, to avoid serious checking.

The sites selected for air seasoning should be free from weeds and decayed wood and well exposed to air currents. If possible, the yard should be covered with cinders. The ties should be elevated on creosoted stringers at least 6 in. above ground. The stringers should be laid close to the ends of the ties in order to retard checking.

Ties cut from conifers are less likely to check during seasoning than ties cut from broadleaf trees, and in consequence can be piled more openly.

If ties are seasoning too fast they should be piled closer together; if seasoning too slowly they should be piled more openly. Ties cut in winter can be piled more openly without danger of checking than ties cut in summer. The 8 x 2 form of pile will give general satisfaction; more open forms are the 7 x 1 and 7 x 2.

Serious end checking, if not controlled by methods of piling, can be retarded by driving S-shaped irons over the check.

The length of time ties should season before treatment will vary primarily with the species of wood, form of pile, and period of the year. In general, ties cut in spring and summer will be seasoned sufficiently for treatment by the end of the following autumn; ties cut in early spring will be seasoned sufficiently by the following early autumn; the seasoning period varying from about two to four months. Ties cut in autumn and winter will be sufficiently seasoned by the end of the following spring, the period varying from above five to eight months. The periods necessary to season dense ties like the oaks will generally be from two to three months longer than those just given.

A preliminary soaking of ties in water to increase their rate of air seasoning and their absorptive properties is not recommended unless it can be done without extra expense. The slightest advantages gained are not sufficient to warrant an appreciable expenditure of time or money.

When ties are received at the treating plant they should be piled in groups according to the way in which they take treatment, those which absorb large quantities of preservative being piled separately from those which are difficult to impregnate. The species which should comprise the various groups are not as yet as well known as is desirable, but the distinction can at least be made between those that behave very differently under treatment. Only thoroughly seasoned ties should be treated. It is bad practice to mix seasoned and green or only partially seasoned ties in one charge. The aim should be to treat all ties in a charge with approximately the same amount of preservative.

At present it is not known definitely what preservative or process is most economical in all cases. Under heavy traffic, where the ties wear out before they rot, treatments with zinc chloride or light treatments with creosote may be advisable. When the traffic is light, heavier injections may be better. If the ballast is wet or moist, creosote is to be preferred to zinc chloride.

No matter what kind of ties are treated or what preservative is used, at least all of the sapwood and as much of the heartwood as possible should be impregnated with the preservative.

If ties are to be treated with zinc chloride, and absorb the preservative readily, the solution should be made dilute, and as much as possible injected. This is better practice than having the solution more concentrated and forcing only a limited amount into the outer fibers of the wood.

The treating plant should be in good operating condition before any ties are treated. Leaky valves and pumps should not be permitted, and all gage scales should be accurate and the pulleys and floats running free. After treatment the excess preservative should be returned to the same measuring tank from which it came, and the reading corrected for temperature if necessary. If the float system is used, the amount of absorption should be determined by measuring the difference in the height of the float before the preservative is run out of the tank and after it has been returned to it.

While the track scales are generaly desirable for determining absorption, they cannot be depended upon if the ties are to be steamed or boiled in oil.

As the composition of the preservative is very likely to

change after a number of treatments, it is highly desirable to have it analyzed frequently to see that it meets the specifications.

Creosoted ties which are not to be used immediately should be piled solidly (9 by 9), while those injected with zinc chloride should be openly piled, to permit of rapid seasoning. In doing this the precautions against too rapid seasoning should be observed. Zinc-treated ties should be seasoned before being placed in the track, in order to avoid as far as possible the leaching out of the preservative and corrosion of the spikes.

If a nine-sixteenth-inch diamond-pointed cut spike is driven into a previously bored hole three-eighths to seven-sixteenths inch in diameter it will hold better than an ordinary cut spike driven directly into the tie.

From the results of tests thus far made it appears highly desirable to use screw spikes whenever possible. When they are used holes should first be bored deep enough in the tie to allow a space between the base of the hole and the point of the spike, or the hole may be bored entirely through the tie.

It is not possible at present to say which of the various types of tie-plates are best. The data thus far secured, however, point to the advisability of using heavy metal plates with flat or only slightly corrugated bottoms. When screw spikes are used, the heads of the spikes should be protected from lateral thrust by a boss of metal fitting snugly under the head.

DON'TS FOR THE OPERATION AND CARE OF MOTOR CARS.

The following "don'ts" for the operation and care of motor cars taken from a copyrighted instruction paper on "Railroad Track Motor Cars" issued by the Educational Bureau of the Union Pacific will be of interest to all users of motor cars:

OPERATON.

Don't fail to test your brakes immediately after starting, to insure that they are in proper working condition.

Don't run a motor car alongside a moving train. Smoke and cinders may obstruct your view of the track ahead. Lumps of coal or other articles may fall from the train and derail your car or injure some one on it.

Don't run a motor car between a train and a station platform. There is danger of striking persons passing to and fro, trainmen jumping on or off trains, baggage trucks, etc.

Don't run rapidly while passing any standing train. There is danger of striking a person who may unexpectedly step from between the cars.

Don't follow a moving train closer than 1,000 feet. There is danger of the train breaking in two or stopping suddenly.

Don't approach road crossings where the view is obstructed, faster than five miles per hour. There is danger of striking teams and pedestrians.

Don't run two cars nearer to each other than five telegraph poles. The head car might break down or leave the track, or men might step off or fall from it.

Don't push any kind of a car ahead of the motor car. There is danger of the car ahead being derailed.

Don't pull or push hand cars or speeders unless absolutely necessary. The levers on these cars when they are moving rapidly throw the cars out of balance and make them jump the track. The levers may strike men on the car and cause injury. The journal boxes of the wheels are not designed for high speed. When it is necessary to move such cars with a motor car, couple them behind, never push them.

Don't load tools on the car carelessly. Some might fall off and derail the car or injure employees.

Don't let men sit with their legs between the motor car and a push car trailer. There is danger of their getting hurt.

Don't "work" the car when passing teams. It might start a runaway that would cost some one's life.

Don't run over interlocking switches or derails without getting a clear signal from the towerman. A switch may be opened just in front of, or under the car.

Don't run through spring frogs. There is danger of springing or bending car axles, or of derailment.

Don't run rapidly through gangs working on the track. There is danger from tools being left on the rails, men stepping in front of the car, or from dirt or other material left on the rails.

Don't overload a motor car. There is danger of permanent injury to the car, or of the car breaking down when passing over switches, dirty road crossings, etc.

Don't try to see how long you can keep ahead of a following train. Your car may break down or it may take longer to get it off the track than you estimate.

Don't run a car at night without a red lantern and a white lantern properly displayed. You may run into other cars, or trains without a headlight may run into you.

Don't place a lighted lantern near the gasoline tank on a car.

Don't start until you are sure you have enough gasoline.

Don't make "grand stand" stops. The brake may fail to work.

Don't exceed fifteen miles per hour. It is against the rules and likely to get you into trouble.

CARE.

Don't fail to make a complete inspection of all parts of the car and engine before starting.

Don't let nuts, bolts and fastenings get loose.

Don't let oil, grease or dirt accumulate on the car. It softens the wood, loosens bolts, ruins the insulation of wires and looks bad.

Don't use gas pliers, pipe wrenches or cold chisels on nuts. It ruins the nuts.

Don't use big wrenches on small nuts. It is easy to strip the threads or break the bolt.

Don't take a car apart unless you are sure it is necessary.

Don't run a car with defective wheels, axles or other moving parts. To do so is to invite accident.

Don't fail to stop and examine the car if you hear any "strange noises" when it is running.

Don't leave a car exposed to wind, rain and dust and then expect it to give you good service.

Don't run a car with a leak in the gasoline pipe. You may burn up your car.

Don't put gasoline into the tank without straining it. It may delay you at a critical time on account of clogging up the carbureter or mixing valve.

Don't handle gasoline by the light of a lantern. Many men have been burned by such carelessness.

Don't over-oil the car. A drop in the right place is better than a quart.

Don't run a car too long without oiling it.

Don't use common black oil on small bearings. It is a poor lubricant.

Don't get oil or grease on the wires. It ruins the insulation.

Don't hold a spark plug wire more than one quarter-inch away from the engine with the current turned on when testing. You may ruin your spark coil.

Don't throw away spark plugs unless they are broken. Spark plugs don't wear out. Usually all that is needed is cleaning.

Don't screw spark plugs in too tight. They may "bake" fast. Graphite should be used on the threads if available.

Don't throw away dry batteries in winter until you have tried thawing them. Often they are only congealed or frozen up.

Don't leave the battery switch closed or gasoline turned on when the car is not running.

Don't connect over six cells of good battery in a set. It is likely to over-load the spark coil and burn it out.

Don't leave strands of flexible wire sticking out around connections. It may "ground" your circuit.

Don't forget to drain the water from the cooling system of a

water cooled car in cold weather when necessary, to prevent the serious damage that would occur from freezing.

Don't attempt to use any method to warm up the carbureter in cold weather that might ignite the gasoline. Cloths that have been heated or better still that have been soaked in hot water and wrung out fairly dry are safest.

TESTS OF LONG LEAF PINE TIMBERS.

The results of a series of tests on long leaf pine bridge timbers made by H. B. MacFarland, engineer of tests, Atchison, Topeka & Santa Fe, have been published in bulletin 149 of the American Railway Engineering Association. The purpose of the tests was to investigate the effect of the full cell creosote treatment on long leaf yellow pine bridge timbers, particularly as to the strength of the timber. Thirty-two standard stringers 7 in. by 16 in. by 28 ft. were selected from stock which had been seasoned approximately 10 months. Each of these sticks was sawed in half, one half being creosoted and the other half remaining untreated. Two sets of tests were run, one immediately after treatment and the other at the end of one year. Two special specimens were prepared in order to compare the relative strength of the butt and top portions of the tree. These specimens were all treated.

In summing up the results of the test the bulletin brings out the following conclusions:

The moduli of rupture found in the transverse tests were quite uniform, the average value being 4,955 pounds per sq. in. This is considerably lower than the value usually given in text books for long leaf pine and from this and other recent tests, it would seem that 5,000 pounds per sq. in. is a very good average value for the transverse breaking strength of such timber. This lower value is due largely to the fact that timbers of this size usually fail by horizontal shear in the transverse tests so that the actual tensile strength is not reached. The results would seem to demonstrate that stringers might be made shallower, but reducing the depth of stringers would undoubtedly be poor practice in bridge work as the additional depth gives added stiffness.

The tests on the butt and top sections indicate that the butt end of a tree is stronger in all respects than the top end. In one case the modulus of rupture was 30 per cent. greater for the butt than for the top end. This large difference is shown by examination to be due mainly to the presence of knots in the top end. The moduli of elasticity are approximately equal.

The tests on the treated and untreated portions of the same sticks show that there is very little difference in the strength of treated and untreated timber. The average modulus of rupture for untreated specimens tested immediately after treatment is five per cent. greater than that for treated. The horizontal shearing strength averages two per cent. greater for the untreated. The elastic properties are very nearly identical. The moisture content seemed to have a considerable bearing on the strength of the timber tested immediately after treating. In the tests made one year after treatment, the average strength of the treated timber is shown to be increased, proving conclusively that long leaf pine timber treated by the full cell process of creosoting and allowed to weather for one year is in no way inferior to untreated timber.

The following tables show the average strength of treated and untreated timbers immediately after treatment and one year after treatment.

Transverse Tests.

Specimen.	Elastic limit. Lbs. per sq. in.	Modulus of rupture in lbs. per sq. in.	Modulus of elasticity in lbs. per sq. in.	Deflection at Failure. Inches.	Maximum Shear. Lbs. per sq. in.
January, 1911—					
Untreated	4,260	5,160	1,595,000	1.15	415
Treated	4,240	4,980	1,600,000	1.12	408
January, 1912—					
Untreated	3,850	4,750	1,554,300	1.18	377
Treated	4,305	5,263	1,544,700	1.17	414

Compression Parallel to the Grain.

Specimen.	Elastic limit in lbs. per sq. in.	Modulus of elasticity in lbs. per sq. in.	Maximum load in lbs. per sq. in.	Deflection for 2,000 lbs. per sq. in.
January, 1911—				
Untreated	5,277	621,000	6,180	0.055
Treated	4,770	568,000	5,650	0.052
January, 1912—				
Untreated	5,075	529,400	5,958	0.051
Treated	5,553	633,000	6,440	0.041

Compression Perpendicular to the Grain.

Specimen.	Elastic limit in lbs. per sq. in.	Load in lbs. per sq. in. for a deflection of 1/10 in.	3/16 in.	3/8 in.
January, 1911—				
Untreated	1,031	727	1,120	1,530
Treated	1,150	711	1,107	1,540
January, 1912—				
Untreated	986	704	1,052	1,483
Treated	945	1,056	1,340	1,691

AMERICAN WOOD PRESERVERS' CONVENTION PROGRAM.

The ninth annual convention of the American Wood Preservers' Association will be held at the Hotel Sherman, Chicago, on January 21-23, 1913. The interest manifested indicates that this will be one of the most successful meetings in the history of the association, the membership for the past year also showing a very healthy increase. The present officers are: President, E. A. Sterling, forest and timber engineer, Philadelphia; first vice-president, A. M. Smith, Ayer & Lord Tie Company, Argenta, Ark.; second vice-president, H. M. Rollins, Gulfport Creosote Company, Gulfport, Miss.; third vice-president, G. B. Shipley, Pittsburgh Wood Preserving Company, Pittsburgh, Pa.; secretary and treasurer, F. J. Angier, superintendent, timber preservation, Baltimore & Ohio, Baltimore, Md.

Among the papers to be presented are the following: "Natural and Artificial Seasoning of Douglas Fir for Treatment," by F. D. Beal, manager, St. Helens Creosoting Company, Portland, Ore.; "Safe Steaming Temperatures," by R. L. Allardyce, superintendent, International Creosoting and Construction Company, Texarkana, Tex.; "Comparison of Zinc-Chloride with Coal Tar Creosote for Preserving Cross Ties," by Howard F. Weiss, assistant director, Forest Products Laboratory, Madison, Wis.; "Preservation of Lumber for Car Construction," by J. H. Waterman, superintendent of treating plant, Chicago, Burlington & Quincy, Galesburg, Ill.; "Efficiency in Handling Ties, Timber and Piling at Treating Plants," by A. M. Smith, superintendent, Ayer & Lord Tie Company, Argenta, Ark.; "Treating Plant Design," by G. B. Shipley, president, Pittsburgh Wood Preserving Company, Pittsburgh, Pa.; "Twenty-six Years of Creosoting," by J. C. Haugh; "Merits of Various Woods for Paving Purposes," by H. G. Davis, Creosoted Wood Paving Block Association, Chicago, and "Care and Treatment of Floors," by George W. Saums. A short paper descriptive of experimental treatment of ties with and without initial air pressure will also be presented by R. S. Belcher. Among the topics for discussion will be, "Objections to Wood Paving Blocks and How to Overcome Them."

The order of the program will be as follows:

Tuesday morning—Formal opening. Secretary's report, president's address, communications and committee reports.

Tuesday afternoon—Preservatives.

Wednesday morning—Plant operation and miscellaneous.

Wednesday afternoon—Ties, Timbers, Piling, Poles and Cross Arms.

Thursday morning—Paving Blocks.

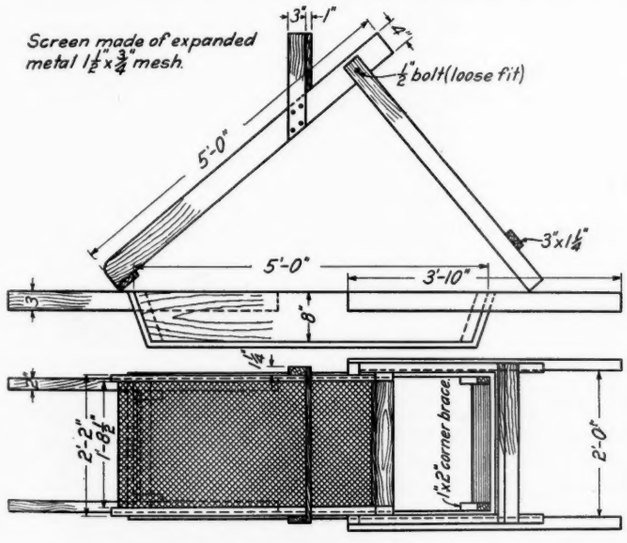
Thursday afternoon—Business session, election of officers, etc.

KEEPING STONE BALLAST CLEAN.

Necessity for Protecting It from Dirt, also from Cinders; and an Effective Method of Screening Ballast on Renewal.

By C. E. Lindsay,
Division Engineer, New York Central & Hudson River, Albany, N. Y.

One of the principal advantages of stone ballast is the excellent drainage which it makes possible. The quality of hardness of the stone prolongs its life against the destructive action of the elements and the tools employed in building and maintaining track. It binds together in a way that distributes the loads more uniformly over greater areas and with less motion of its parts, which assists in holding the track in place. It contains nothing which can germinate into plant life or afford a rooting place for vegetable growth. The most important advantage of stone ballast, however, is the fact that it does not absorb or retain moisture. A substance that would otherwise make good ballast is undesirable, if it is an absorbent, especially in a cold climate where the action of moisture and frost disintegrates it or causes deterioration in other parts of the track structure. A substance broken so small or of such a fracture or cleavage that its parts pack close together and form pockets that retain moisture, is equally objectionable; so the "two inch" broken stone ballast is the ideal material for class "A" construction.



Stone Ballast Screen.

But it is asked—"What is the life of stone ballast?" How often must it be renewed?" and "What are the causes leading to its destruction?" The annual renewal of ties, the annual lining and surfacing of the track, and the more frequent tamping of the ties at joints and at weak spots in the embankment or at points where the traffic is unusually heavy, all tend to wear out the stone. The action of sun and water, heat and cold, may reduce the particles perceptibly, but the one great cause that limits the life and destroys its usefulness, long before it is worn out from any other cause, is the closing of the voids by foreign substances both from above and below.

In the construction of new track with stone ballast, it is possible to form the cross section of the subgrade so as to afford drainage laterally for any water that passes through the ballast; and it is possible to uniformly spread suitable substances in sufficient quantities to prevent the stone ballast from sinking into the subgrade; but on old track the ballast is a composite substance which is the result of a process of development beginning with the substance of the subgrade itself and adding better materials from time to time. Through a course of years in many cases, the material between the subgrade and the bottom of the tie becomes a mixture of clay, sand, cinders, gravel and what-not, varying greatly in its density, porosity, quality, and thickness. It is upon such an irregular and unstable foundation that the modern trackman is expected to build a track structure that will carry with safety, comfort and economy a traffic density of more than 150,000 freight car miles per year per mile of track and 10,000 passenger car miles per year per mile of road at maximum speeds.

With a new subgrade composed of clay or similar substances, the tendency of stone ballast is to sink into it, each particle lubricated by the wet clay, until all semblance of a uniform cross section is lost, pockets and depressions are formed which hold moisture, and soon the whole benefit of the more expensive ballast is lost and practically nothing can be done but add more stone and provide partial drainage along the sides of the track. Where this condition can be anticipated, a layer of engine cinders of requisite thickness and the proper provisions for drainage of cuts and level places will deter this action, but where this has not been done the rate of settlement determines the life of the ballast. As a general proposition stone ballast is more quickly destroyed from above than from below. The droppings of grain, coal, sand and gravel from passing trains, the waste from dining and passenger cars, and the dirt, sand and seed blown on to the ballast from adjacent banks and fields, quickly fill the spaces between the stones, and this material absorbing moisture, is soon germinated into vegetation. Little can be done to prevent this action, although the planting of grass and evergreens on sandy ground deters the process.

Better maintenance of cars, and better regulation of discharge from passenger trains may in time be secured; but the most prolific, unnecessary, and avoidable source of this objectionable material is that which is dropped from locomotives. The sparks from the locomotive stack are generally scattered by the exhaust and the prevailing winds, and are the least objectionable. They cannot be greatly reduced in quantity except as better grades of fuel or methods of firing are used, but the ashes which are dropped from the ash pans are concentrated between the rails in constantly increasing quantities, so hot sometimes as to burn the ties, or fuse into solid masses. As a rule too, the greatest deposit of ashes from such sources is at points where the engines work hardest, hence where track should be at its best. This has been contributed to in large measure by the enforced introduction of bottom dumping ash pans so arranged that they can be dumped without the necessity of a man going beneath the engine. Such devices necessitate more or less machinery which is easily deranged, or prevented from operating by ice or clinkers, with the result that the normal position of such device is "open," allowing the ashes to fall directly from the grates to the track. The increase in the size of locomotives has resulted in a greater disproportion between the grate area, fuel consumption, and the cubic capacity of the ash pan so that it is deemed necessary to scatter "a little" along the road to avoid having to stop to dump the ash pan. The increase in grate area also demands a corresponding increase in "draft" area, which most enginemen and firemen feel is insufficient unless the ash pan dampers are open.

These features of modern locomotive operation alone shorten the life of stone ballast fully one-half. They can not be entirely eliminated, but they can be materially reduced, 1st, by the introduction of mechanical stokers; 2nd, by the proper design and maintenance of ash pans and draft openings, and

3rd, by the proper operation of these devices while the engines are on the road.

It costs about $4,000 per mile of single track for stone ballast in place. It costs about $25 per mile of single track to clean up the winter's accumulation of cinders, etc., that remain above the top of the ties. It costs about $50 per mile of single track to clean up similar accumulation during the balance of the year, together with what is forked or screened out of the ballast. It costs about $270 per year, per mile of single track to remove the ballast from between ties and between tracks, down to the bottom of the ties, screen or fork it and return it to the track, replacing the 25 per cent. of stone wasted by the operation. This has to be done thoroughly every five years or the track deteriorates very rapidly.

On the basis of these figures there is an annual expense of $345 per mile of single track due to the defective design, construction, maintenance or operation of locomotive ash pans and draft openings, a large portion of which might be saved. In automatic signal territory having continuous track circuits the practice of running locomotives with ash pans open is also dangerous, as it is essential that the ballast be kept from touching the rails and that it be kept as clear as possible of material that may short circuit the track or deplete the battery.

The customary way of cleaning stone ballast, if cleaned at all, is by the use of a ballast fork. This well known tool is awkward to use both because of its weight and size. When filled with as much stone as it will hold, it is more than the average laborer can lift, to say nothing of using it as a screen. Manipulated as well as may be, it is inevitable in lifting a fork full of ballast, that a large percentage of dirt is lifted also and this must be separated from the stone by tossing the stone in the air and catching as much as possible of it on the fork again. A very large proportion of the smaller stone passes through with the dirt and is lost. The process must be repeated frequently to recover 50 per cent. of the available stone in average dirty ballast. Anyone who will give this process any study must be convinced that as a screen the ballast fork is a distinct failure. As a convenient appliance with which to handle broken stone, the ballast fork has some virtue. The separate flexible prongs do permit of getting the tool into the mass more easily than is possible with a shovel, but when used around track, the ballast fork is useless for getting the ballast out from between the ties and its greatest virtue is when filling the center of the track and in dressing up the ballast at the ends of the ties.

On a single track road of any density of traffic, the problem of cleaning the ballast is a simple one, as there is ample space on either side for men to work safely and comfortably with any device, but on a road with two or more tracks, the problem of cleaning the ballast becomes more difficult of solution. Here, trains run in opposite directions at the same time and the difficulties and dangers of the track man multiply. The ballast between tracks is deep and compact and must frequently be loosened by a pick before it can be handled with any tool; then the space is limited and there is the problem of the disposal of the dirt, which must be carried across the adjacent tracks in some suitable receptacle that will not allow it to befoul the cleaned ballast. Thousands of dollars are wasted annually in improper and slipshod practices in connection with this process.

The screen shown in the accompanying drawing is designed to overcome in a measure the disadvantages of the ballast fork and present methods. The way it is to be used is very different from that ordinarily followed, of standing near the foot of the incline, throwing the material up on the screen, allowing the coarse particles to roll down at your feet and the finer portions to pass through the screen to the opposite side; with this method the cleaned stone accumulates in a pile at the foot of the screen and must be disposed of by carrying it back of the screen before the screen can be moved forward, a costly and lengthy process.

The modus operandi with the arrangement of box and screen illustrated, is to shovel all the stone to be cleaned from between the ties into the space between or outside the tracks, then clearing a spot big enough for the box, down to the desired depth. The box is placed in it parallel with the rails, the screen is set up at the proper angle so that the dirt falls in the box and the cleaned stone at the end of it. Two men then begin shovelling dirty ballast *over the high end of the screen,* and as the clean stone accumulates at the lower end, two men shovel it back into the track. As the dirty stone recedes, the box and screen are moved toward it and the process is continued until the box is full of dirt, whereupon the screen is laid to one side and the box is carried across the tracks and emptied. The screen is of such dimensions and so arranged that the legs can be quickly tripped and the screen lowered to clear passing trains. The advantages are, the use of the shovel at the bottom of the ballast, a continuous performance in one direction without lost motion, and a maximum of efficiency with a minimum of effort and loss of material.

COSTS OF MAINTENANCE PER MILE.

W. A. Gardner, president of the North Western, replying to an inquiry from a stockholder as to the amount necessary to expend upon the maintenance of way and structures, says: "The amount per mile that should be expended to keep the right of way and structures in a state of high efficiency should, under modern conditions, decrease, instead of increase, annually. Where rock ballast replaces gravel ballast, the first cost is three or four times that of gravel; but the work, when thoroughly performed, needs very little attention for a period of years, and puts the right of way in a condition to bear the heaviest traffic without injury to the rail or ties. When a 100-lb. rail replaces a lighter rail, it has a much longer life than the one it replaces, and consequently a less amount has to be charged off for renewal of rails. The treatment of ties by creosoting nearly doubles their life, and materially cuts down the percentage to be charged for maintenance of way; incidentally, I would state that the North Western has thus treated over 7,000,000 ties in the past few years.

"Another important factor in reducing the expense of maintenance of way has been the replacing of wooden bridges and culverts with steel and concrete construction. This work will stand for years with little or no expense for repairs, whereas the wooden structure has a comparatively short life, and is also in constant danger of destruction by fire.

"Notwithstanding the saving effected by these means of increasing the efficiency of the road bed and structures, the amount expended by the North Western in the year 1912 was within 1 per cent. of the amount spent for maintenance in the year 1911.

"While from the foregoing it might appear that the maintenance charge might reasonably be expected to show a decrease in the same ratio that the increase in the life of material and efficiency of construction have added, it must be considered that the first cost of making these improvements is greatly in excess of the ordinary charge for maintenance. The installation of interlocked switches at crossings and the construction of automatic signals, together with high priced, and, in some cases, less efficient labor, are the factors which militate against a reduction in the charge for maintenance.

"But when the day finally arrives when there are no wooden bridges and culverts to replace; when the entire system is laid with 100-lb. rails; when every mile of track is rock ballasted; when an automatic signal system is installed, and there is no track elevation left to be done, then we can expect a reduction in the maintenance of way charge, in line with the figures which the increased life of material and efficiency of construction would seem to warrant."

THE HINDOO AS A TRACK LABORER.*

The Seventh and Last of a Series of Discussions of the Characteristics of the Various Types of Maintenance Workmen.

CHARACTERISTICS OF THE HINDOO.

By Charles M. Kipp,

Roadmaster, Southern Pacific, Marysville, Cal.

While Hindoos are not employed as extensively as some other nationalities in this vicinity, they are found in comparatively large numbers. I find that as a rule they are hardly strong enough for all branches of construction and maintenance work, but they have some good points which are in their favor. As with other classes of labor, the amount of work secured from the Hindoo depends largely upon the attitude of the foreman. The majority of our foremen dislike to work the Hindoo. For this reason, where they are worked in the same gangs with other foreigners, it is well to separate the different classes and keep them by themselves. I find that they are intelligent, especially in learning the different kinds of work easily and quickly, and I believe they excel all other foreign nationalities in learning to speak the English language. They pronounce their words very clearly, probably due largely to the fact that they are English subjects and have been accustomed to hearing the English language spoken in their own country. I have found them to be more reliable and trustworthy than some other classes of laborers when not under the direct supervision of the foreman, and they never refuse to do what they are told and do not find fault. In one instance I sent a gang of Hindoos to clean the brush away from the abutment of a bridge during a flood. I had expected that they would refuse to work when they saw the task which was before them, but to my surprise, they expressed no fear and got out on the brush and logs which lodged against the bridge, cutting them apart so that they could float down the stream. At another time I set the gang of Hindoos at work transferring freight without a foreman to watch or instruct them, and found that they worked faithfully all day.

The chief objection to the Hindoo is that he is not strong enough or physically as well adapted for track work as for other kinds of labor. He is too tall to do pick and shovel work, but for this reason many of them are employed in orchard work, to which they are well adapted. They much prefer contract work and take large contracts in orchard work and in the beet fields.

Their manner of living is much the same as that of other foreigners. They are contented to live in an outfit car, tent or any old shack. Their food is peculiar. I have seen them cook a chicken, drink the broth and throw the meat away. They will not eat beef, as in their country the cow is considered sacred. They are also very particular about their drinking. They have two dippers and a bucket. The dippers are never dipped into the bucket and neither will one man drink after another without first washing out the dipper which is then refilled out of the bucket with the other dipper.

While the Hindoo likes liquor, he does not appear on the work intoxicated to the extent that other classes do. They do not smoke on the work, which is in their favor when making a comparison with some other classes of foreign laborers. The Hindoo generally has plenty of money in his pockets, and many of them have good bank accounts. They never wear a hat, but in place of it wear a turban which is tied to their hair.

To secure good work from the Hindoo the foreman should not yell at the men and attempt to drive them, but can secure better results by quiet instructions. I also believe in eliminating the interpreter as far as possible, as they are usually the cause of strife among the men, and frequently cause whole gangs to leave the service on short notice. For the past year I have eliminated the interpreter and have had very little trouble with the men leaving the work.

CHARACTERISTICS OF THE HINDOO.

By A. Palm,

Roadmaster, Southern Pacific, Sacramento, Cal.

Hindoos are naturally uncommunicative and are not talkative like the Greeks, Italians and other foreign races. Foremen rarely have trouble with them, as they are of a peaceful nature and when not under the influence of liquor, they are not antagonistic. It is very seldom that one will find an agitator among them, and no matter what conditions they are working under, or how poor the accommodations that are furnished them, they enter no protest; this being largely due to their religious belief, one of the principal teachings of which is fatalism. In cases of danger they will show no signs of fear. On numerous occasions I have known of their going into dangerous places and moving obstructions after Greeks and others refused to work for fear of personal injury.

According to their religious belief they have many fast days which leave them in a weakened condition, unable to stand a hard day's work. As a rule they are shiftless and lacking in ambition. Being naturally slow, both mentally and physically, they are not adapted to the pace we set for the other races. Of course there are exceptions to this. On one of my sections there are two Hindoos who are good energetic workers, equally as good as the very best that can be found among the other races. However, this is a rare case and they average considerably below any of the other races. With but few exceptions they can understand and converse in English.

While they will not drink water from vessels used for that purpose by "disbelievers," nor eat food in any form that has been prepared by anyone of a different religious belief, they do not hesitate as to the propriety of drinking alcoholic liquors brewed or distilled by the disbelievers in their faith. If located in or near a town, their patronage of saloons is large and almost without exception they drink to excess. While under the influence of liquor they are quite the reverse of what they are when sober and at work, quarreling and fighting with each other so that they are frequently jailed either for disturbing the peace or for assault and battery.

Even when sober they are dishonest in their dealings with one another. They do not consider stealing a crime, and if convinced that one among them has a considerable sum of money on his person, several of them will lie in wait for him and rob him of it.

They are very filthy in their habits and complaints are constantly entered against them on account of the unsanitary conditions of their camps. Cleanliness surely is not one of their virtues. I know of no race who are as filthy and unclean as they are. They spend their money freely and they are always on pleasure bent; they will attend every celebration held within forty miles of where they are camped; and fiestas, carnivals and such jollifications are very frequent occurrences in California.

They apparently have a distaste for track work. They will not work on the track as long as they can find other employment, such as fruit picking, beet cultivating and beet harvesting, which occur during our busiest season on track. At such times we cannot induce any of them to enter our employ, and those who are at work will leave as soon as the season opens in the orchards and beet fields. On the whole, I do not consider them desirable as track laborers.

*Three articles in the *Railway Age Gazette* of June 21, page 1568, discussed "The Hobo as a Track Laborer"; four in the issue of July 19, page 121, discussed "The Negro as a Track Laborer"; four in the issue of August 16, page 303, discussed "The Italian as a Track Laborer"; four in the issue of September 20, page 527, discussed "The Mexican as a Track Laborer"; four in the issue of October 18, page 746, discussed "The Pole and Slav as Track Laborers," and four in the issue of November 15, page 949, discussed "The Japanese as a Track Laborer."

AUTOMOBILES FOR INSPECTION SERVICE DURING CONSTRUCTION.

By H. Cole Estep.

During the construction of the Minneapolis & St. Louis west of Watertown, S. D., the headquarters of the division engineer in charge were at Aberdeen, S. D., his jurisdiction extending from Watertown through Aberdeen to Leola, a distance of 114 miles. It was necessary to make at least two inspection trips per month over the entire line, the territory traversed consisting of a rolling prairie crossed by an occasional water course. After some experience with livery teams for such inspection trips, automobiles were substituted, resulting in considerable economy. These motor cars were hired from garages at Aberdeen or Watertown at the prevailing rates, which were known to be very profitable to the owners of the machines. The automobiles were particularly valuable on account of the large amount of time which they saved for busy officials. The total livery bill often amounted to as much as $500 per month.

Records were kept of the cost of various trips both by automobile and with teams, from which the accompanying table has been prepared. This shows the details of each trip, including the kind of automobile used, passengers carried, weather and other physical conditions encountered, time required, expense, delays and value of the time saved by the automobile.

The horse vehicles used on the division were ordinary country livery rigs hired at the prevailing local rates. The motor cars were of the common light touring car type and were not new. There was considerable variation in the rates charged. The machines were used in all kinds of weather and over all sorts of roads. A number of runs were made in driving rains. The roads were such as are usually encountered in a comparatively new farming community, and were almost invariably dirt tracks full of ruts and holes with short corduroy culverts. The latter were especially trying to the machines. Hills, especially on the western end of the line, were frequent and at the foot of each grade there was a bad spot in the road which had to be passed at slow speed, making frequent use of the low gear necessary. This consumed considerably more fuel than would have been required if the roads had been even ordinarily good. At times the automobiles were driven over the soft, unfinished railway grade or through new cuts, the nature of which is familiar to every engineer. Frequently, important appointments had to be kept or connections made with trains, and as the time of the men making the trips was valuable, delays were expensive. In general the conditions were about as severe as could be found.

Although the charges for the motor vehicles were 50 per cent higher per hour than for livery rigs, the time saved to the high-salaried officials was worth two or three times the difference in charges. This feature was especially noticeable on long, hard trips with heavy loads under adverse conditions, such as in trip No. 4, when with the chief engineer, division engineer and traveling freight agent on board the value of time saved these men by the automobile was $150, equal to over $1 per mile for the whole trip. In computing the value of the time saved by the automobile the following scale was used: chief engineer's time, $3 per hour; division engineer's time, $1 per hour; right-of-way agent and freight agent's time, $1 per hour each.

If the machines had been owned by the railway company, thus eliminating the owner's profits, and operated under the economical conditions which would then have been possible, undoubtedly the running expenses could have been reduced to a level more nearly corresponding with the livery charges and the value of the time saved would have been practically all clear gain. Also in almost every case the expense of a chauffeur could have been eliminated.

TABLE SHOWING COMPARATIVE EXPENSE OF AUTOMOBILE AND HORSE VEHICLES FOR INSPECTING RAILWAY CONSTRUCTION WORK.

Trip Number.	Miles.	Rated H. P. of Auto.	Passengers carried in addition to chauffeur.	Weather.	Condition of Roads.	Grades.	Number of Business Stops.	Total Time for Trip—Hours.		Total Expense per Trip.		Delays Due to Machine Failures—Hours.	Value of Officials' Time Saved by Automobile.
								Auto	Horse	Auto	Horse		
1	40	..	Chief engineer and division engineer	Good	Bad	Medium	0	5	8	$7.50	$10.00	1	$12.00
2	65	25	Chief engineer and two division engineers	Good	Fair	Steep	10	8	16	15.00	10.00	0	40.00
3	120	25	Chief engineer, division engineer and right-of-way agent	Good	Fair	Medium	21	15*	30*	45.00	30.00	1	75.00
4	120	30	Chief engineer, division engineer and traveling freight agent	Rain	Bad	Few	30	30*	60*	45.00	36.00	1	150.00
5	100	25	Division engineer	Good	Fair	None	0	5	16	10.00	15.00	0	11.00

*Does not include time for necessary night layovers from 6:00 p. m. to 8:00 a. m.

ADVANTAGES OF RENEWING TIES TO FACE.

By R. P. Trabue,

Roadmaster, Nashville, Chattanooga & St. Louis, Nashville, Tenn.

In the report of the tie committee of the American Railway Engineering Association, last year, there appears the report of the sub-committee appointed to investigate the comparative merits of "tie renewals in continuous stretches versus single tie renewals." Thirty-five replies were received to a circular letter sent out to various railways asking what the practice was in this regard, and, based upon these answers, the committee recommended the practice of single tie renewals.

After making a careful and conscientious study of these thirty-five replies, I fail to find that they are supported by figures based upon actual experience or thoughtful approximation. I have kept complete records upon certain portions of the road under my supervision where ties have been renewed to face for a space of four years, and my records disprove the above conclusion.

Based upon the actual records kept, the method of renewing in continuous stretches possesses the advantages over single tie renewals of economy; minimum cost of raising low joints and lining, and less disturbance of roadbed; entire elimination of extra gang labor; and more uniform rail bearing.

The average cost per mile of putting up track for a six-year period is as follows:

3,000 ties at 50 cts	$1,500
1,200 cu. yds. rock ballast at 50 cts	600
Labor	947
	$3,047

The item of labor cost given herein embraces a ten per cent. increase, as the current wage scale has been increased by that figure over 1910, which was the basis of the former discussion on this subject. (See *Railway Age Gazette*, August 18, 1911, page 333.)

The objection most often urged by officials in charge of maintenance of way against renewing ties in continuous stretches is the item of waste of ties. Upon this point it may be stated that upon the original installation of this method of renewals in continuous stretches and upon other renewals subsequent thereto, every tie that can possibly be used again is put into sidings, but in the accounts no credit has been made for such ties. Hence they are practically thrown away so far as the accounts go, but in spite of this fact the figures show that the cost of maintenance of track by renewals in continuous stretches is over $200 per mile less than by single tie renewals.

In the matter of raising low joints and lining, these figures show a reduction of such items to an average yearly cost per mile of $92, which, so far as I have been able to ascertain by widespread inquiry, is from one-third to one-seventh of similar expenditures by any railway in this country which maintains first-class track. This exceedingly low figure of expenditure for these purposes, of itself, strongly indicates that a desirable and safe minimum of disturbance of roadbed is necessitated by the employment of the method of renewal in continuous stretches and that a better general condition of track is thereby secured and maintained.

By the employment of the method of renewing ties in continuous stretches upon this road it has been discovered that an entire elimination of extra gang labor is accomplished. Upon this point it is to be noted that the figures show that extra gang labor is, on an average, about $400 per mile more expensive when putting up track than when the same work is performed by the regular section gang labor, and the work done by the extra gang is inferior to that of the section gang.

The last advantage is what I consider the most important to be obtained by the method of renewal of ties in continuous stretches, a more uniform degree of rail bearing. Experience with both methods of renewals has shown that the greatest safeguard against broken rails lies in the highest possible degree of uniformity of resistance of the ties. Statistics show that the number of derailments caused by the broken rails is greater than that due to any other defect of railway roadbed. (See *Railway Age Gazette* of January 12, 1912.) These same statistics show an average of one broken rail for every 714.4 rails in track, of Bessemer steel. On 139 miles of main line track on this division laid with 80 lb. rail, open hearth and Bessemer, two rails broke in 24 months, or an average per year of one broken rail for 44,480 rails in track. In single tie renewals there may be at all times a sufficiency of good ties to prevent rail spreading, the joints and low places may be kept up, the drainage may be good, the surface smooth and the rail in first-class condition; yet with all these desirable elements present which go to make up a good track, the broken rail does occur. The most feasible steps towards the prevention of broken rails does not lie in the employment of heavier rails, but rather in the betterment of the condition of roadbed underneath rails of serviceable weight, and I believe that the use of 80 lb. rail with the method of renewing ties in continuous stretches is more in conformity with an earnest and thoughtful endeavor to reduce the number of this kind of accidents than the use of heavier rail with single tie renewals.

An intelligent contrast of the comparative economy and excellence of the two methods of renewal cannot be had without the keeping of thorough, correct and detailed accounts upon all such work done. With this idea in view, blanks were printed and furnished to each of my section foremen to be filled out by them monthly and reported in at the end of each month's work with their time books—these blanks, in connection with their time books, showing the amount of work done in the smallest degree upon every possible branch of track maintenance. Special care has been taken to see that these accounts were correctly kept by each foreman during the period covered by the figures referred to in this article, and for this reason the amount of work that has been done and its cost, down to the smallest detail, are known.

NEW LINES IN SWITZERLAND.—Several important though short lines of railway were completed in Switzerland during the past year. Among them the following are worthy of mention: The Bernina Pass line, 37 miles, connecting the Engadine with the Italian railway system at Terano; the Davos branch of the Rhaetisch road, which also traverses the Engadine valley; and the Sweisimmen-Leuk branch of the Montreux-Oberland railway, which passes through one of the most beautiful sections of the Bernese Oberland range. The latter is a link in the chain of mountain roads financed by the Canton of Berne at a cost of $26,000,000.

LAYING DRAIN TILE.*

By P. J. KEENAN,
Supervisor, Erie, Cuba, N. Y.

During the past year it was decided to lay 15,000 ft. of six in. drain tile on the Genesee River railroad, the new freight line built by the Erie to connect the Allegheny division at Cuba, N. Y., with the Buffalo division at Hunts.

This line was opened for traffic on July 1, 1910. It had been built through a very rough country, the twenty miles on the east end being practically all cuts and fills. Much difficulty was experienced in holding the track in surface and line through these cuts which were of a very soft clay which was continually slipping in and filling up the surface ditches. At the time of starting to lay the tile these ditches were full in many places and as it was desired to lay the tile from 3½ to 4 ft. below top of rail on both sides of the track it made necessary the hauling out of a large amount of material. The handling of this material would have proved very expensive if done by hand on account of its character. When attempts were made to load it by hand it was found that the clay would not leave the shovel until it had been struck quite a severe blow on the floor of the car to jar it loose. Another difficulty was the tendency of the sides of the ditch to cave in before the ditch was completed and tile laid, making it necessary in some cases to go back over the work and open the ditch the second time. It was not always possible to lay and cover the tile as fast as the ditch was made on account of the scarcity of cinders which were used in covering the tile.

To assist in this work a train crew with 15 flat cars equipped with stakes and aprons were used in connection with an American ditcher. The ditcher crew consisted of an engineer and a fireman, no laborers being required while the train was being loaded. After the train was loaded it was run to a dumping ground near at hand where a gang of eight men and one foreman with a ballast plow, Lidgerwood unloader and spreader car were used to unload it. With this outfit dirt was loaded and unloaded at a cost of 10 cents per cu. yd., about 25 carloads being an average day's work.

When the dump gang was not required on the dump, the men accompanied the train to the place of loading and while the train was being loaded opened up the ends of ditches, and removed all dirt from ballast that might have fallen from the train so that when ditching was complete in any one cut the track presented a neat appearance. The ditcher in most cases dug three ft. below the top of rail, leaving only one ft. of digging to be done by the ditching gang which followed the train. Aside from digging three ft. deep, the ditcher removed enough dirt so that there was sufficient space outside the ditch line next to the slope to take the material removed from the lower foot, thus avoiding loading it by hand or taking it out with wheelbarrows. This made it possible not only to cover the tile with cinders but also to remove a large amount of mud between the ends of ties and the line of tile which space was filled with cinders, thus providing better drainage. In laying the 15,000 ft. of tile only three days' work loading by hand was done, this being necessary in one cut where the slope was so near the rail that there was not sufficient room for the ditcher to work.

After the ditch was completed four ft. below the top of rail rough hemlock boards were laid in the bottom of the ditch in the softer cuts and in others six in. of cinders were used in the ditch before tile was laid. After the tile was placed it was covered with coarse engine cinders, which were unloaded from center dump cars, and shoveled into the ditch by hand. After this a spreader car with shaper wing was run through these cuts, leveling the cinders over the top of the ditch. In doing this work care was taken to avoid all unnecessary mileage by the work train crew and dump gang. The dump gang and ditcher crew were given bunk cars which were moved from point to point as the work progressed. Arrangements were also made for the

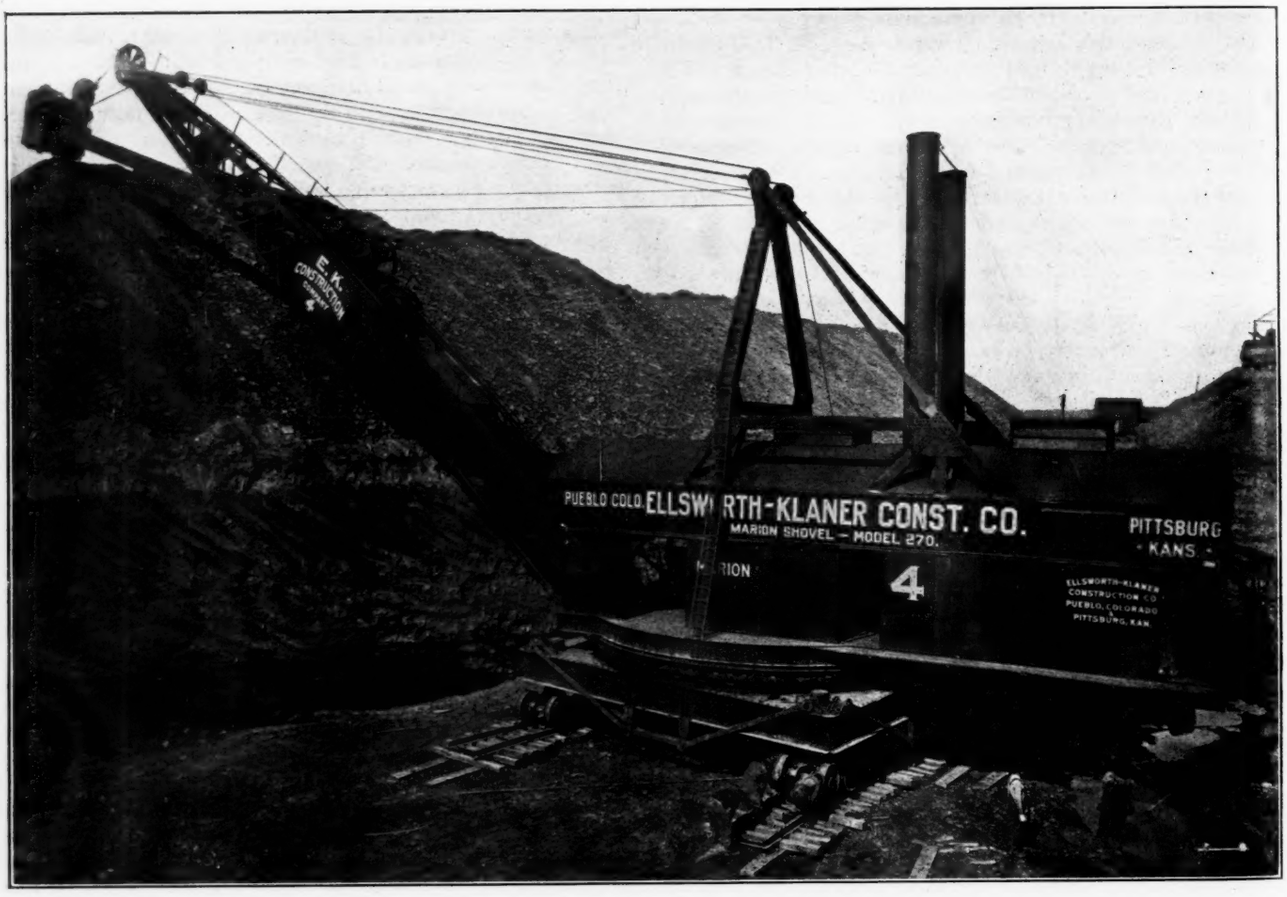
*Entered in the Track Kink contest, which closed December 25, 1911.

work train crew to lay over at night at the most convenient point and numerous dumping grounds were used convenient to the work. In many cases it was only necessary for the train to move out of the cut to the first fill.

A LARGE STEAM SHOVEL.

By P. H. Hamilton,
St. Louis & San Francisco, Pittsburg, Kan.

The use of steam shovels for removing the overburden from beds of coal in the mining district of southeastern Kansas and southwestern Missouri, is doing much to increase the coal tonnage in this vicinity. There are thousands of acres of surface coal which, until recently, were considered unavailable, as the coal is too far below the surface to permit of successful stripping with scrapers and teams, and the roof is too faulty to permit of underground mining. By the use of steam shovels these obstacles have been overcome.



A 250-Ton Steam Shovel with a 90-Ft. Boom and a 54-Ft. Stick.

This coal lies from 12 to 30 ft. below the surface, is from 3 to 3.5 ft. in depth, and is of an excellent quality. The covering consists of shale and yellow clay and is easily handled. The first steam shovel work in this district was begun late in 1910 for the Central Coal & Coke Company, near Weir, Kan. While this 70-ton shovel was successful in a way, it could not handle the heaviest stripping without the aid of a drag line excavator to move the material away from the berm in order to prevent it from sliding back into the pit. For this reason it was decided that a larger shovel with a longer reach would be better suitable for this heavy work. A Marion, Model 250, shovel similar to the ones used on the Panama canal was then secured and has been used with such success that there are now 12 or 14 of these shovels in this district. However, in some instances, where the stripping was heavy, it was found that the dirt would still roll back onto the coal, and it was decided that a still larger shovel would be more successful. Accordingly, a new shovel known as the Marion, Model 270, was designed, the first one of which is now stripping a coal bed for the Central Coal & Coke Company on the coal branch of the St. Louis & San Francisco, four miles southwest of Pittsburg, Kansas. It is believed that this is the largest steam shovel in the world, the length of the boom being 90 ft., the length of the dipper stick 54 ft., the capacity of the dipper 5 yds., the clear lift above the top of the rail 63 ft., the reach from the center of the machine to the center of the dump 103 ft., the working weight 250 tons, and the capacity 3,000 cu. yds. per day.

The shovel revolves in a complete circle and will place the excavated material 200 ft. away from the face if necessary. Like the smaller shovel, it has a four-wheel truck under each corner and runs on two parallel narrow gage tracks built of six sections of 135-lb. rail. The shovel is equipped with two 150 h. p. boilers and requires a crew consisting of an engineer, cranesman, oiler, fireman and eight pitmen. Unlike the smaller shovels, it is not necessary for the shovel to stop work while the pitmen are placing the track ahead of it as the dipper moves so far ahead of the shovel that the men can work in perfect safety.

To transport one of these shovels it is necessary to take it apart. It requires about six weeks for a gang of men to assemble the parts and get the shovel to work.

Argentine Railway Concession Asked.—A concession has been asked by Juan B. Lalacut for a narrow-gage railroad of 250 miles, to run from Mal Abrigo in Santa Fe to Anatuya, in Santiago del Estero.

MASTER PAINTERS' ASSOCIATION CONVENTION.

Abstracts of Seven Papers Read Before the Ninth Annual Meeting of This Organization at Chicago in November.

The ninth annual convention of the Maintenance of Way Master Painters' Association met at the Karpen Building, Chicago, November 19, 20 and 21, 1912. Nearly 100 master painters and visitors were in attendance.

The officers of the association for the past year were, president, George Heinz, P. & L. E., Pittsburgh; vice-president, C. H. Plummer, C. R. I. & P., Topeka, Kan.; secretary and treasurer, W. G. Wilson, L. V., Easton, Pa., all of whom were re-elected for the ensuing year. Charles Ettinger, I. C., Chicago, was also elected second vice-president. Louisville, Ky., was selected as the place for holding the next annual convention.

THE TESTING OF PAINTS.

J. S. Sheaf, engineer of tests of the Illinois Central, read a paper on the above subject, of which the following is an abstract:

Since the paint chemist has entered the field, vehicles have been put on the market which conform in their essential features to the genuine. It is almost impossible to check up all of these and it would therefore appear that laboratory investigations are of secondary importance. However, certain ingredients are known to give the best results. If manufacturers load up the vehicle with adulterants and the pigment with inert materials the railroad chemist can determine such conditions immediately, whereas, by practical test, too much time would elapse before the discovery. On the other hand, take the case where the goods furnished appear to be as good as the best and on analysis are found to be satisfactory. A time test is the best check on both the goods and the analysis. This requires co-operation between the paint foreman and the test department.

Each of the various manufacturers supplying material should be assigned a number or a letter and this, together with the date, should be stenciled on the work and a record kept. Any officer of the road could note the date of application and, if provided with a key, make his own comparisons as to what manufacturers were furnishing satisfactory material. On general lines this system would cover everything painted, from a passenger coach down to a switch target, at a cost hardly appreciable.

In general the system followed on the Illinois Central is towards a concentration of effort. Close relations are maintained with everyone who can assist in the procuring of better paint. Analyses are made on receipt of every doubtful shipment coming in. Colonial yellow, for instance, may be procured from several manufacturers. The first thing is to be certain as to the proper shade. If it is wrong and the paint is badly needed it is worked over in our paint mill. This being an error on the part of manufacturer, a bill for the work at cost should be rendered, or if there is time enough the manufacturer should replace the goods in question.

If the shipment is of any size, a sample is analyzed and if it fails to correspond to requirements, the shipment is rejected. As a further check the work is stenciled for future identification. On a refrigerator car full information is stenciled on the needle beam. In addition a test board is painted with one, two and three coats and exposed to the weather.

When the merits of various paints are desired, all of the makes represented are applied to both sides of the same car, and properly marked. Thus, between the analysis, test cars and test boards, an absolute and comparative check is possible to an exact degree. In fact, every car has its paint history stenciled on the needle beam and the whole subject of paint records is an open secret to any who have the key.

THE INSPECTION OF PAINT MANUFACTURE.

A paper on the above subject was prepared by A. W. Carpenter, engineer of structures, N. Y. C. & H. R., the following being an abstract:

On the New York Central Lines a practice in the purchase of paint has been inaugurated which the writer believes is novel and promises a satisfactory solution of this perplexing problem. Committees were appointed to represent the engineering departments of the New York Central Lines and New York Central & Hudson River, respectively, for the purpose of preparing specifications for standard station paints. Specifications were prepared by these committees jointly and adopted by the Maintenance of Way committee of the New York Central Lines, George W. Kittredge, chairman, and later put into effect on the New York Central & Hudson River and some of the other New York Central Lines. These specifications were divided into two parts, one concerning the manufacture and mixing, the other, application. It is with certain features of the specifications for manufacture and mixing that this paper is concerned. These specifications were thought to be unique in that they specify, in addition to the features ordinarily covered by such specifications such as formulae, quality of ingredients, drying, fineness and color requirements, and check on the manufacture by chemical analysis of samples of the finished paint, the additional requirements, the method of manufacture and the inspection of manufacture.

The specifications require the mixed paint to be furnished in paste form unless otherwise specified. While this feature is not new, it may be considered unusual. The idea of the committees in regard to this was that the railroad companies should have the paste furnished at certain central points where they would establish paint mixers and stores of oils and drier. They would thus have better control of the quality of the drier and of the greater portion of the oil entering into the paint, and still not deprive the paint manufacturers of the larger portion of the business. It was estimated that this arrangement would also effect some saving to the railroad companies in the cost of the finished paints. Of course, the simplest and perhaps the most satisfactory way to solve the problem from the view point of the engineer and painter would be for the railroad companies to establish their own paint factories, buy the raw materials, the quality of which would then be most assuredly under their control, and manufacture the paint at a probably lower cost than by purchase from paint manufacturers. It was, however, not considered wise or proper, from the railroad business point of view, to adopt so radical a course.

The usual method of testing the fulfilment of paint specifications by the examination and chemical analysis of samples of the finished product may be stated to be of uncertain value, at least. In the first place the paint is manufactured before the samples are taken and is frequently used up before the analysis is made. In the next place, it is difficult, if possible, for the chemist to determine the kinds and proportions of many specified ingredients from analysis of finished paint samples—he may find the chemical equivalents but he has to guess to a large extent at how these were combined in the form in which they were introduced in the paint; as to the quality of the ingredients he is lost, and quality is a matter of first importance, especially in regard to the oil and drier. In the third place, it is difficult to determine from an examination of samples that the necessary care in mixing and grinding has been taken in the manufacture.

Our specifications therefore require that, if called for, preliminary samples of all the ingredients proposed for use shall be submitted by manufacturers; and further that, unless especially waived, the manufacture of the paint shall take place only in the presence of an inspector representing the railroad company.

These specifications have now been used in practice for more than a year. No paint has yet been furnished by manufacturers in paste form, so far as the writer is aware, and in that respect they have not been tested. They provide, however, just as fully for the furnishing of paint in finished form and in respect to producing paint which is of the kind and quality specified, and in open competition, based on price only it is believed that they are

a decided success. This may be stated to be due to the inspection at the factory.

In the working out of orders under these specifications the purchasing agent invites the paint manufacturers on his list to quote on furnishing paint under the specifications. The order is placed with the lowest bidder who has the necessary facilities for complying with the specifications, and who is instructed, in the order, that the manufacture must not proceed before conferring with the paint inspector. The paint inspector then advises whether or not preliminary samples of ingredients will be required and whether or not the manufacture will be inspected. Preliminary samples are generally not required in case of manufacturers who have been filling orders of paint satisfactorily under the specifications and, therefore, know the requirements, and inspection at the factory is frequently waived in case of very small orders by such manufacturers. In the inspection, the inspector sees the ingredients taken from the packages or bins, and introduced into the paint, notes labels or trade names on packages of ingredients, checks the weights of ingredients used, takes samples of all ingredients whenever he chooses and sends them to the chemist for analysis, sees that the paint is mixed in the prescribed manner and ground as required by the specifications, checks the weight, color and fineness of the finished paint, paints out a sample coat and checks for working, appearance and drying, and finally sees the paint shipped in packages or seals the packages which are left at the works pending the result of the analysis of ingredients and paint by the chemist. The chemist has not only a sample of the paint to analyze but has samples of each ingredient entering into the paint. The inspector has noted the exact amount of each material used, so that his work, combined with that of the chemist, leaves very little chance for any evasion of the specifications.

Some manufacturers have refused to manufacture paint under these specifications on account of the inspection clause. Many have not only not objected to this but have proclaimed themselves in favor of the inspection as insuring them protection against under-bidding by ignorant or unscrupulous manufacturers who would otherwise furnish cheap materials and less thorough manufacture than specified.

In the course of inspection several cases have occurred in which it was shown that the specifications would not have been fulfilled if the inspection had been omitted. Sometimes this has been due to the idea which has been found rather prevalent among manufacturers that, having secured the order, they are privileged to substitute cheaper ingredients and methods than those specified, with the justification that, in their opinion, just as good paint would result. In other cases the specifications have not been thoroughly studied or understood before the order was placed and in a few cases, perhaps, there was a deliberate intention of substituting inferior materials and work in the hope of escaping detection. On the other hand a number of manufacturers have been exceedingly conscientious in their endeavor to fulfil the specifications to the letter, and it should also be stated that the prices in these cases carried only small margins for profit.

There are, of course, manufacturers that tell us that there are secret methods and materials by and with which they can make paint far superior to any that can be made under our specifications, and that we should therefore not burden them with specifications but trust to their reputation to furnish superior paint, and, of course, they cannot have their secrets open to inspection. In days past when little was generally known about paint and paint materials, such an argument might have been accepted, but knowledge in respect to paints and paint materials has been very greatly extended during recent years through the technical press, and the various associations, so that the making of protective paints today may be considered a fairly open art.

We believe that our specifications provide for as good paint for the purpose as is known to the art and that, by requiring fixed proportions of commercial ingredients of specified grades or quality to be combined and manipulated in a prescribed manner, they permit very slight, if any, variation in the quality of the paint; that the inspection clause insures the specifications being followed and that, consequently, orders may be confidently placed with all competent manufacturers on a strictly cost basis.

It may be considered advisable to state something as to the cost of inspection such as described. This depends upon many features, mostly perhaps on the amount of paint in any single order inspected and the per-diem output of the manufacturer. Our records show costs as low as one cent per gallon for inspection, and one and one-half cents for analysis on orders of from 400 to 1,000 gallons of one kind of paint manufactured by concerns with a large output located near the inspector's headquarters. An average of five cents per gallon for inspection and analysis of orders of 500 gallons and upwards would perhaps be a fair estimate. The writer ventures to state that the wider competition made possible by the inspection method will result in obtaining prices for the paint enough lower than under the old method to more than eliminate the cost of the inspection.

PAINTING AT THE SHOP.

O. F. Dalstrom, office engineer, bridge department, C. & N. W., read the following paper:

The specifications for steel railway bridges and other steel railway structures invariably require that the fabricated material shall be painted at the shop. This practice is so general, and has been followed so long that there is little probability of any extensive departure from it, unless we can find some method that will be more effective in protecting the steel, and will, at the same time, have the merit of ultimate economy.

The necessity for painting steel at the shop may be summed up in a single statement—it must be protected from corrosion, which begins as soon as the material leaves the mills and continues, with a rapidity depending on the atmospheric conditions to which it is exposed, until it is checked by a protective coating that excludes the air and prevents further oxidation of the metal.

The shop coat, coming directly in contact with the metal, is the one which must be depended on to prevent the rust-forming process, by effectually excluding the air, and being the foundation on which the other coats are spread to form the complete protective covering, the importance of it is readily apparent. It is on account of the importance of this first coat and the difficulty of getting a satisfactory coat at the shop, that there is a tendency to dispense with shop painting altogether in certain kinds of work, and to apply the first coat after erection, when it can be done under the supervision of the company's paint foreman.

It is practicable to dispense with shop painting when the rolling, fabrication and erection are all completed within a short period, and provided the painters follow close behind the erectors. This would apply to small bridges, viaducts, signal towers, and the structural steel that enters into the construction of freight sheds, shop buildings, and yard equipment. But in all large structures the fabrication and erection cover such an extended period that the shop coat is imperative. Whatever may be the defects of shop painting, they are not as serious as the corrosion of the steel that is becoming covered with rust while it is waiting for its first coat of paint.

While it is generally accepted that shop painting is necessary, in all except a limited class of railroad work, the objections to it are so many and so vital that it will be worth while considering them in detail. They can be brought together into the following well-defined groups: Painting on improperly prepared surfaces; painting under improper atmospheric conditions; painting done by unskilled workmen, frequently without competent supervision; difficulty of maintaining thorough inspection of other shop work, concealed by the paint; difficulty of handling freshly painted material.

When the steel comes from the mills it is covered with mill scale, much of which clings to it through the entire process of fabrication. By the time it has reached the paint shop there will be found in addition, rust, oil, grease, dirt, and usually moisture. The rusting begins as soon as the steel leaves the rolling mill.

The oil, grease, and other foreign matter are collected under the fabricating machines, particularly the drills and reamers. Moisture on the surfaces depends on the atmospheric conditions.

Steel exposed to moisture-laden atmosphere will have a thin film of moisture over the surface. It is not practicable to maintain a dry surface in damp weather, and paint applied under such conditions can have no strong adhesion to the metal. In addition, the film of moisture would be enclosed under the paint, the resulting corrosion further loosening and breaking the continuity of the protective coating. Very cold weather is not favorable for obtaining a uniform and unbroken coat. Exposure to the hot sun tends to produce blisters, and, in the presence of moisture, to cause peeling.

The surfaces to be painted should be dry and warm, and the painted material should be protected from the weather, from extreme cold and from the direct action of the sun until the paint is well dried. The plant which does part or all of its painting in an open yard, which has no well equipped paint shop protected from the weather, is not prepared to do good shop painting. The quality of the work will vary with the weather conditions and there can be no uniformity in the results. It may be urged that the same objection applies to painting in the field. In a measure this is true; the painting cannot be protected from the weather. But the field painting is done during the most favorable seasons; the work is done under the supervision of the company's own foreman and, with reasonable precautions, gives good results.

It is the usual thing to find the paint applied in the shops by men who are unskilled in the work—they have simply been given a paint pot and brush and been instructed to do as the others are doing, and the foreman, very probably, is a man without the training necessary to handle the work properly.

The shop manager seldom criticizes the equality of the work; if the painters get a practically uniform color on a sufficient tonnage, there will be little complaint from him. Likewise the inspector will not bother the painters if they will keep away from the steel until he has completed the inspection of the shop work. Accordingly, scant consideration is given to the condition of the surfaces to be painted, atmospheric conditions are disregarded, and the paint is manipulated with thinners and driers in order to cover the most surface in the least time. There are any number of ways to make time in a paint shop at the cost of quality of work, and a painter who is held accountable only for the amount of the work may be trusted to find them all.

The inspector pays no attention to what the painters are doing, unless the steel happens to get to the paint shop before the inspection of the shop work has been completed. After the steel has been painted, the only inspection that can be done is the checking up of dimensions. Defects in material, screw plugs, lead collars, and imperfect fittings are all covered up and concealed by paint. To add to the inspector's troubles, the painters are continually painting out the shipping or identification mark on the steel.

All shop men know how gingerly a loading gang approaches freshly painted steel. They know that such material has a habit of slipping off the hooks, racing along the skids, and skewing out of adjustment in loading. Obviously, the simplest way to dispose of this difficulty would be to wait till the paint is dry, but this is not always possible. The shop is usually under instructions to ship as fast as the material is ready; or the paint shop may be congested with accumulating material. If the painting is done in a roomy yard, the material can be left where it is painted until it is to be loaded; but this brings us back to the objection of painting outdoors, just referred to.

Assuming, then, that shop painting is necessary, the next thing is to correct the questionable practices at the shop. Practical methods will be worked out when the railroads and the inspection companies co-operate with the shop managers to bring this neglected part of the maintenance schedule up to the standard of the construction work. But the initiative must be taken by the railroads. The shops will continue to turn out only what is required of them, and when proper shop painting is one of the requirements, the shops will meet it in a practical way.

Any complete set of rules laid down here to bring about satisfactory shop painting would probably be defective in some details, but a few suggestions are offered as a start in the right direction.

The railroads should supply the paint direct to the shop, ready to apply. This would do away with the incentive to slight the quality or the quantity; and it would leave no opportunity for the painters to manipulate the paint with thinners and driers, in order to make better time.

The railroad bridge painting should be under the direction of a master painter who should report directly to the proper official of the engineering department and be responsible for results in all the work coming under his direction. The master painter, having this responsibility fixed upon him, would immediately make it his business to know exactly what was being done at the shops; and, working directly with the engineer, would be able to bring the necessary pressure to bear on shop managers to correct the abuses he might find. This would be done through the agency of the shop inspectors. The procedure would be simple. Give the shop inspector explicit and thorough instructions as to how this part of the work is to be executed; have it plainly understood that this work will be passed upon in the field by men competent to decide and report whether the work at the shop was up to the requirements, and that the inspectors will be held responsible for any defective work that gets through. We should then find inspectors giving the same attention to the painting that they now give to the machine work. They would require surfaces to be clean and dry. They would not permit painting under unfavorable weather conditions. They would insist on competent and trustworthy foremen on the painting, as on the machine work. And the shop manager, finding that this work must be up to a certain standard before it will be accepted, would place the right kind of a foreman in charge of the work and give him competent workmen. With the right kind of men at work in the paint shop there would be less annoyance from obliterated shipping marks, and other troubles originating with incompetent workmen would disappear.

This outline is simply a suggestion. The essential thing is to establish a responsibility that will reach from the shop to the engineer's office. When this responsibility is established effectively, we shall have made good progress toward disposing of the objections to shop painting.

INCREASED EFFICIENCY.

H. J. Barkley, Illinois Central, Carbondale, Ill., presented the following paper:

To obtain the best results in any work it is always best that the employer should have confidence in and be willing to accept the judgment of men who, by years of experience, have become experts in their lines of work. Equally so should the mechanic be willing to protect his employer's interest by reason of his ability. There is always a place for the mechanic who can take care of the side lines which, by custom, have fallen to the railway painter. It is true that the company may never know that you did not clean out and paint the inside of a gutter when painting a building, but it is a fact that when you do and do it well you have doubled the life of this piece of sheet metal work.

There is always a man in the crew who can make light repairs to plastering and fasten a few bricks in the top of a chimney or who can, with a little patience and a very small amount of material, make a leaky roof tight. When repairs are made to a building it often happens that the carpenter has overlooked some little thing. It may take you but a few minutes to correct this which is much better than depending on a man from some other crew to come some distance. The repairing of a stove, placing water barrels, and inspecting fire extinguishers can all be done in connection with the regular work. Some railway painters make the mistake of thinking that they must leave undone what cannot be done with a brush. Snow blockades, wash outs and

wrecks should find them just as apt as other crews in their department. When painting a water tank it is a very easy matter for the men on the staging to tighten the hoops, take them down and cut them if necessary, and a man on the stage with an arm full of oakum can do a world of good to a leaky tub. If you haven't the tools, borrow them, or, better yet, keep a set of wrenches in your outfit. Cleaning and oiling the roller ends of truss spans can be economically done when painting the structure.

A velocipede car with two men will paint as many switches and mile posts, except in large yards, as a hand car with four men, which is the smallest crew that should use a hand car with safety. On branches, switches may sometimes be painted off the way freight. A small way station can be painted just as well and cheaply in winter as in summer, and the office building had better wait until winter, but it is entirely different with a leaky water tank that may happen to be 50 feet in the air. It does not seem advisable to paint boundary and land posts when the weeds in summer are as high as a man's head. Neither is it economical to wait until the first blizzard of winter to set several hundred glass in the round houses and shops, for the men must work bare handed and soon become numb with cold and, also, steam and frost prevent puttying.

PROTECTIVE COATINGS FOR STEEL BRIDGE FLOORS.

A. W. Carpenter, engineer of structures, N. Y. C. & H. R., prepared the following paper:

In the preservation of steel railroad bridges from corrosion, the particular parts which perhaps offer the most difficulty are the tops of transverse floor members, such as floor beams and transverse floor troughs, especially on bridges over which refrigerator cars pass. On the New York Central & Hudson River, as probably on all other roads, the ordinary painting of these parts has generally proved ineffective in the zone of the brine drippings. Various paints have been tried, some of which have been much more effective than others, but none have given more than about two years' good protection over the zone of drippings under the average conditions.

Paints that would appear to be unaffected when tested in the laboratory by the application of brine taken from the cars to coatings on specimen plates would soon fail in service on the bridges. This discrepancy is explained by the different conditions of application and exposure. In the laboratory tests, the paints were applied to clean dry plates and were thoroughly hardened before the brine was applied. On the bridges the surfaces were probably imperfectly cleaned and the coatings were damaged by drippings, dirt or abrasion before drying, and after drying, suffered abrasion and other mechanical injury, and damage from hot coals. Weather conditions would also aid the action of the brine. Instructions have been issued requiring thorough cleaning of surfaces for painting and the covering of the parts with tarred felt or other material to keep them dry after cleaning and until the paint should be dry and hard. It may be that these instructions will lead to better results with paints, but these can, at least, offer little resistance to abrasion, hot coals, and other destructive agencies peculiar to the location.

Quick drying is a very desirable quality for coatings for these parts, and considerable body is needed to resist abrasion and other mechanical damage. A coating possessing these qualities is one of coal tar or coal tar and Portland cement mixed, the preservative qualities of which are excellent. The tar, or tar and cement mixture, is applied hot with mops, and the immediate hardening process is due to cooling and not to drying as the term is applied to paint. Refined coal-gas tar should be used—not water-gas tar. The surface to be coated must be clean and dry to insure adherence and protection. Where a priming coat of paint can be applied, it is recommended but is not essential. The mixture of tar and cement is preferable for locations subject to the heat of the sun, as the cement hardens the coating, thereby increasing its resistance to flowing, and its alkaline nature should neutralize any acid in the tar. We have prepared this coating by first heating the tar in a kettle and then sifting into it from one-half to an equal volume of Portland cement and boiling the mixture one or two hours before application. This coating has given excellent results on plane surfaces, but in many instances has failed to protect the rivet heads, which have been found to be the especially difficult parts to protect in the difficult location under consideration.

Whether the use of a larger proportion of cement in the mixture would cause the coating to hold better on the rivet heads is not known, as little experimenting with different proportions of cement and tar has been done to the writer's knowledge. We have found that on the flat surfaces of the floor beam and trough tops and on the vertical sides of troughs filled with ballast this coating has protected well for several years, except where burned by hot coals from locomotives or removed by mechanical means. This coating has been adopted and used for several years for protecting the floor troughs of the Park avenue viaduct, in New York City, a four-track structure one and one-fourth miles long. The coating is applied as the troughs are opened for tie renewals, it being possible to clean and coat a trough and replace the ballast all during the same day. The life of ties on this viaduct is about four years, for which period the coating promises to protect the steel. No refrigerator cars are operated on this viaduct, but there is considerable deflection in the floor, which is a probable cause of the short life of plain coatings previously applied thereon. The quick drying or hardening of the coating, and the heavy body, combined with its close adherence to the metal and the excellent preservative qualities, make it far superior to the paint coatings previously used, which would not protect longer than two years. A wash of neat cement grout, to be applied on top of the tar and cement coating has been suggested, and the writer thinks this would assist in hardening the surface of the coating and in increasing its efficiency, but he cannot at this time give any satisfactory information from service. The use of graveled surface roofing felt over the coating on top surfaces is being tried out. It protects the coating greatly from mechanical injury.

Our experiment with the tar and cement mixture and various other coatings included cement-mortar protection. The latter has by all odds proven the most successful for the tops of floor beams and troughs. It has been applied by mixing a stiff mortar of one part Portland cement to two parts sand and plastering the same on the tops of the beams, after painting, to such a thickness as to cover the rivet heads at least ¼ in. A reinforcement of poultry netting in the mortar layer has been specified for each case but generally omitted in the application. The top of this mortar layer has in some cases been covered with roofing felt, mopped in place with roofing pitch, the felt bending over the edges of the mortar to shed water; in other cases the felt has been omitted, but the writer believes that the felt covering should be applied for waterproofing of the mortar slab, the better protection of the tops of the rivet heads which can generally have only a thin coating of mortar, and the general binding together of the mortar surface to prevent it from cracking up.

The first service experiment with the mortar coating was made on the tops of the troughs of a solid double-track floor in 1908. The tops of these troughs had suffered considerably by corrosion in spite of frequent painting. The troughs have less than the desired strength, for which reason they are to be replaced shortly, and consequently the deflection of the floor is quite marked. In spite of this deflection the mortar coating, covered with roofing felt, has held intact to date, except where injured by track tools and principally by dropping rails on it in distributing them in the course of rail renewals. In another case the mortar protection applied without wire reinforcement and both with and without felt covering, is intact and in practically perfect condition after one year in service. This is on the very stiff floor beams of an open floor bridge.

Of course, the tops of the floor beams and troughs are not the only parts attacked by brine drippings, although perhaps the most susceptible generally, owing to the more exposed position to this and other damaging influences. The bottom flanges and webs

of the floor beams of open floor bridges suffer also, although in less degree, being considerably protected by the deck and the top flanges. The top and bottom flanges of stringers and deck girders and the tops of lateral members suffer sometimes nearly, if not quite, as badly as the tops of floor beams. The mortar protection can be applied to the bottom flanges, where such a thickness can be used that the felt covering should not be required, and the surface can be sloped so as to drain quickly. Web surfaces have generally not been found to suffer so severely as flanges and it would seem that it should be possible to protect them by paint without great difficulty. The tops of stringers and deck girders carrying timber decks do not seem to offer favorable application for the mortar protection which would have to be applied between the ties. We have been experimenting to a small extent with the tar and cement mixture on these. The use of galvanized iron or steel or of zinc sheet metal for a top flange covering on stringers and deck girders between the painted metal proper of the flanges and the ties has been suggested and will probably be experimented with.

OTHER PAPERS.

A paper was presented by C. H. Plummer, Chicago, Rock Island & Pacific, Topeka, Kan., on "The Painting of Bunk Cars with a Distinctive Color other than Common Box Car Color," in which he advocated the painting of all regular special service cars with a distinctive color so that switching or train crews can distinguish these cars from others and can handle them with greater care. Much paint is lost annually by rough handling in switching and many injuries also result from this cause. By painting the cars a distinctive color it was thought that train crews could be urged to handle them with greater care.

Edward Hurst Brown, of the *Painters' Magazine,* presented a paper on "Real Economy in Railway Painting," in which he advocated the specifying or purchasing of paints by the master painters rather than by the purchasing departments, to insure the selection of good materials. He emphasized the economy of buying good paints which will cover a larger surface with less labor than to buy the cheaper materials and pay out an excessive amount for wages in applying them. The durability of the various paints also enters prominently into their relative economy. He advocated the careful examination by an expert of all structures liable to be injured by the weather or locomotive smoke or gases, and their prompt repainting at the first signs of deterioration. He also recommended employing experienced painters as economical because of their ability to do more work and to do it better.

Other papers were presented on "Methods of Handling Crews," by O. Stubstad, C. & N. W., Winona, Wis.; "Has Graining a Place in the Maintenance of Way Master Painters' Curriculum?" by J. S. Rice, master painter, L. S. & M. S., Elkhart, Ind.; "Efficient Iron Bridge Paint," by G. C. Reiboldt, master painter, C. M. & St. P., Milwaukee, Wis.; "The Nature and Use of White Lead and Red Lead," by J. D. Sinkinson, chemist, National Lead Co., Chicago.; "Linseed Oil and Its Practical Testing," by J. W. Hirst, Hirst & Begley Linseed Oil Company, Chicago. Charles Ettinger also read a paper on "The Painting of Structural Iron and Steel," an abstract of which was published on page 759 of the *Railway Age Gazette* of October 18, 1912.

AUSTRALIAN TRANSCONTINENTAL RAILWAY.—A deviation by means of which it will be possible to save about five miles of construction was reported upon by the Chief Engineer, Henry Deane, early in September. Mr. Deane said that the deviation will miss Bulong, and pass through Waterfall and Majestic. He had inspected the route, and found that there would be no difficulty regarding the grade and the earthworks. His report supports the town surveyor of Kalgoorlie, who was the first to suggest that the deviation be made, thus bringing the line into Kalgoorlie, instead of Kurrimia.

SAFETY FIRST IN HANDLING FOREIGN LABOR.*

By EMIL KNACK,
Section Foreman, Chicago & North Western, Oshkosh, Wis.

Foreign laborers have been and always will be a cause of more or less trouble and danger to themselves and to others who work with or near them, and it is important that some system or method of handling this class of laborers should be adopted that will eliminate or reduce the many accidents that are caused annually. Unless a foreman is able to understand and speak their language it is impossible for him to make himself understood except by signs and motions and repeated examples of the work to be done. He must have his eyes on his men every minute to see that they are not struck by passing trains or that they do not leave tools or material on or near the tracks. They cannot be depended upon to do anything alone and do not seem to realize the danger by which they are surrounded.

To reduce the danger of accident and also to increase the efficiency of the crews, I believe that more care and attention should be given at the time of engaging foreign labor for section work to hire only those who have had previous experience or who have some knowledge of our language, and then to assign the men to the different gangs so that there will be at least one man in each crew who has a working knowledge of the American language. In this way the foreman will be better able to impart his instructions to his crew and increase their efficiency as well as to decrease the number of accidents. I would also suggest that when a large number of these men are sent out to a particular district an interpreter fully instructed in safety and efficiency methods should be sent over the territory, visiting each crew, and assisting the foreman in training the men regarding their duties. A foreman handling this kind of labor should adopt a uniform method of giving orders to his men, especially in regard to removing tools and leaving the track before an approaching train. With the assistance of the interpreter or instructor he should soon have them so they would act with almost military precision.

COMMITTEE APPOINTMENTS AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION.

The following appointments have been made for committee work of the American Railway Bridge & Building Association for the ensuing year:

Water Supply.—C. R. Knowles, chairman, I. C., Chicago; J Dupree, C. T. H. & S. E., Chicago; John Ewart, B. & M., Boston, Mass.; J. B. White, C. & N. W., Boone, Ia.; Guy Gordon, C. R. I. & P., Little Rock, Ark.; C. F. Warcup, G. T., St. Thomas, Ont.

Track Scales.—A. M. Van Auken, chairman, Little Rock, Ark.; C. E. Smith, M. P., St. Louis, Mo.; R. C. Sattley, C. R. I. & P., Chicago; H. M Jack, I. & G. N., Palestine, Tex.

Equipment and Tools for Bridge Gangs.—A. Yappen, chairman, C. M. & St. P., Chicago; R. H. Reid, L. S. & M. S., Cleveland, Ohio; F. O. Draper, I. C., Chicago; J. A. Killian, Southern, Charlotte, N. C.

Concrete Culverts and Various Kinds of Pipe for Culverts.—L. D. Hadwen, chairman, C. M. & St. P., Chicago; O. F. Dalstrom, C. & N. W., Chicago; C. J. Scribner, C. B. & Q., Chicago; W. L. Rohbock, W. & L. E., Cleveland, Ohio.

Heating, Lighting and Ventilating of Roundhouses and Shops.—G. W. Hand, chairman, C. & N. W., Chicago; M. A. Long, B. & O., Baltimore, Md.; G. H. Jennings, E. J. & E., Joliet, Ill.; P. E. Schneider, M. C., Jackson, Mich.

Sewers and Drains.—R. O. Elliott, chairman, L. & N., Nashville, Tenn.; A. F. Miller, Pennsylvania, Chicago; E. C. Mor-

*Received in the Safety contest, which closed October 25, 1912.

rison, S. P., San Francisco, Cal.; K. Peabody, N. Y. C. & H. R., New York.

Motor Cars for Bridge Gangs.—A. Yappen, chairman, C. M. & St. P., Chicago; A. Montzheimer. E. J. & E., Joliet, Ill.; C. H. Fake, M. R. & B. T., Bonne Terre, Mo.; P. Swenson, Soo Line, Minneapolis, Minn.

Temporary Structures for Supporting Tracks during Construction of Permanent Work, Sewers, etc.—W. O. Whitney, chairman, B. & A., Boston, Mass.; J. P. Canty, B. & M., Boston, Mass.; G. Aldrich, N. Y., N. H. & H., Boston, Mass.; J. B. Sheldon, N. Y., N. H. & H., Providence, R. I.

Concrete, Posts, Poles, Signs, etc.—G. E. Boyd, chairman, D. L. & W., Scranton, Pa.; F. L. Thompson, I. C., Chicago; A. S. Markley, C. & E. I., Danville, Ill.

Snow Fences.—A. H. King, chairman, O. S. L., Salt Lake City, Utah; C. F. King, C. & N. W., Omaha, Nebr.; F. E. King, C. M. & St. P., Minneapolis, Minn.; Frank Lee, C. P., Winnipeg, Man.; C. S. McCully, N. P., Jamestown, N. Dak.

Preservation of Timber.—George W. Rear, chairman, S. P., San Francisco, Cal.; F. D. Beal, 912 Yeon Bldg., Portland, Ore.; F. D. Mattos, S. P., West Oakland, Cal.; A. J. Catchot, L. & N., Ocean Springs, Miss.

Cattle Guards.—Arthur Ridgeway, chairman, D. & R. G., Denver, Colo.; E. P. Hawkins, St. L. I. M. & S., Bastrop, La.

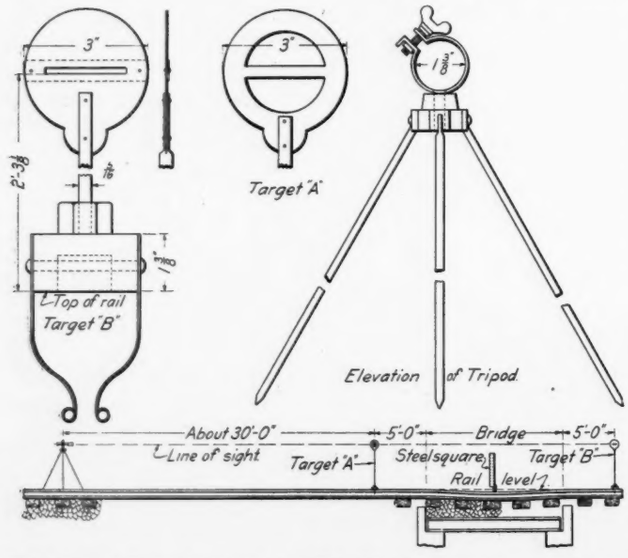
Fire Resisting Coatings for Timber.—Lee Jutton, chairman, C. & N. W., Chicago; W. H. Moore, N. Y. N. H. & H., New Haven, Conn.; W. H. Finley, C. & N. W., Chicago; C. T. Musgrave, O. S. L., Idaho Falls, Idaho; J. S. Robinson, C. & N. W., Chicago.

A DEVICE FOR ESTABLISHING GRADE AND LINE ON BRIDGES*.

By S. C. Tanner,

Master Carpenter, Baltimore & Ohio, Baltimore, Md.

A valuable device for establishing accurate surface and line on bridges, without the aid of an engineer or high-priced instruments, is the outfit illustrated in the attached sketch, which can be secured at very small cost, as the targets and level board can



Tripod and Targets Used for Establishing Grade on Bridges.

be made in one day by one man. An 18 in. telescope, suitable for use with this device, can be purchased at retail at a cost of $1.85.

In using this device, locate a high point on the track at each end of the bridge far enough from the bridge that the raising of the track on the bridge will not disturb it. Then with the telescope located as shown on the sketch, about 30 ft. from the first target and adjusted so it will clearly focus over the crossbar in target "A" and in line with the slot or white mark on target "B" at the far end of the bridge, place a level board on the track at the point on the bridge that is to be surfaced. Use a steel square on the level board for the middle target with the 2 ft. blade of the square standing vertical and in line with the targets and the top of the square measuring the same distance above the top of the rail as the targets. By jacking up the bent or bridge until the middle target is in true line with the top of the crossbar on target "A" and the white mark on target "B" and the level board shows the track level, the track is at the proper elevation. When locating cut-off points on a pile trestle, the same arrangement can be used. In a similar way, by the use of the telescope and plumb bobs, the bridge can be accurately lined.

*Received in the contest on Tools, which closed August 25, 1912.

GETTING TOGETHER FOR SAFETY.*

By F. M. Patterson,

Assistant Engineer, Chicago, Burlington & Quincy, Chicago.

Progress in any line of work is secured by two widely different and apparently antagonistic methods, by invention or originality, and by observation and the adoption of the efforts of others. Until comparatively recent years the first method has been considered by far the most important in the railway industry owing to the rapid expansion of our country and the many problems to be solved in furnishing a maximum of service for a minimum of capital and revenue.

With all the progress that has been made in many directions among the railways there has been one point which has caused criticism and that is the large number of accidents to employees. True the railways have always laid down rules for the protection of their men and have always cautioned them in case of doubt to take the safe side, but in spite of this the list of accidents has been heavy. Among the maintenance forces probably the greatest number have been caused by taking chances when more caution should have been observed, although of late years the situation has been complicated by the employment of the hordes of foreign laborers who are ignorant alike of our methods and our language and who lack the mental alertness of the men they have displaced.

Realizing that something must be done to awaken interest in the promotion of safety among employees, about two years ago one road established safety committees on each division with a central safety committee for the road at large to investigate causes and formulate methods for the better protection of its men. The value of this idea was recognized and followed by others until now a large number of railways have taken up the scheme. At first it seems difficult to do more than has been done in the maintenance department. The rules are explicit and if faithfully followed would be all that are needed. That they are not followed is evident from the number of accidents. Shall the rules be amended by including in them instructions as to every minute detail of the varied work on the track? The writer does not think so, but believes more can be done by co-operation and by keeping the men informed as to the work of others and by stimulating them to take an active interest in their own welfare. The safety committee of one railway adopted the catchword "Get the Safety Habit" and disseminated it by printing it on a button bearing the trademark of the railway.

The instructions on probably every railway in the country require that whenever possible the foreman shall ascertain if all trains due have arrived before starting out with his handcar, and that where the view of the track is obstructed he must protect himself with the proper signals. Yet many accidents have been caused by the disregard of these instructions due to the habit of taking chances when the habit of taking precautions would have prevented them. Dozens of other rules might be cited which

*Received in the contest on Safety, which closed October 25, 1912.

are designed for the protection of the men, but which are rendered valueless because they are disregarded in order to save a little time or to avoid a little extra effort.

The roadmaster or supervisor can do the most good by seeing that all the rules are observed and by furnishing each foreman with a list of all avoidable accidents on his district, showing how they could have been averted. One of our noted humorists has said that statistics are the lowest grade of information that exists. While this may not be exactly true it is certain that they are inefficient unless vitalized by personal application. Therefore this information should be issued promptly after each accident, preferably by bulletin, to insure its receipt by each foreman, but the bulletins should be followed by personal talks with the foremen, and supplemented whenever possible by occasional meetings where discussions may be had on the rules and the serious consequences of disregarding them. The majority of the rules are so plain that there is little chance of their being misunderstood, some of them, particularly those relating to flagging, may require some elucidation and should be gone into thoroughly.

One often hears the plea that the foreman takes chances to avoid censure for not showing results in his work and sometimes it must be admitted that the plea is justified. The roadmaster must take care that this charge cannot be laid to him, and on the other hand he must be on his guard that the drones do not use the efforts for safety as a cloak for inefficiency or laziness. It will often require keen discrimination to insure that no injustice is done, but the issue must be met squarely, for it is one on which success or failure of the movement may depend.

Unfortunately it is as hard to acquire a good new habit as it is to break a bad old one, and the roadmaster who starts on his safety campaign will no doubt find much to discourage him. It is a campaign that must be prosecuted by siege rather than by assault and will require a tremendous amount of plugging before much improvement will be shown, but the results will justify the labor and humanity will be the gainer.

BROWN RAIL UNLOADER.

The Brown rail unloader is designed to load and unload rails, frogs, timber and other heavy material from flat cars or gondolas. The car is equipped with two booms 22 ft. long, on the opposite ends of the car which are operated by two air hoists with 9 in. cylinders laid horizontally on the deck of the car and connected to the train line by two air reservoirs. The booms are supported from "A" frames which can be raised or lowered to meet any required clearance. Either or both booms can be operated at one time. When handling material one man is required to operate the levers and four men are required for each boom, or a total of nine men. These cars are being used by the Boston & Maine, Boston & Albany and Maine Central. On the Boston & Albany, five high side cars loaded with 160 tons of 75 lb. rail were unloaded in three hours and fifteen minutes clearing three trains in the meantime, at a cost of $1.75 per hour for labor. On June 6, 1912, 99 95 lb. rails were handled on the Boston & Albany in 50 minutes with the unloader, using one end only. This car was devised and patented by B. S. Brown, roadmaster on the Boston & Maine and is sold by James C. Barr of Boston.

THE FOREMAN PROBLEM.*

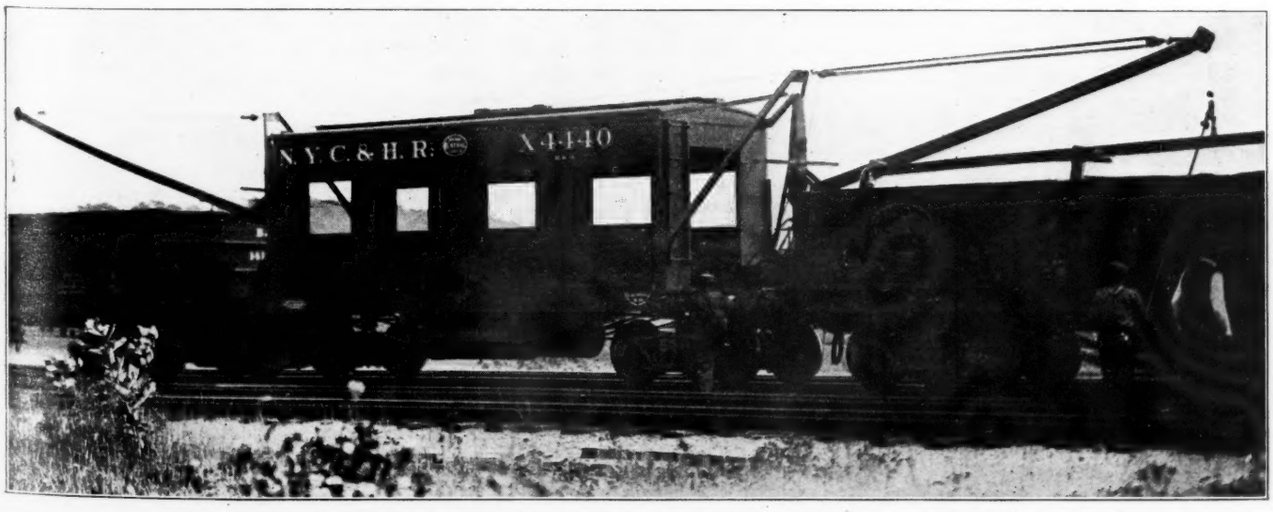
By JOHN CARMICHAEL,
Baltimore, Md.

In one case where the section foreman problem has been solved the following methods are used: Native Americans are employed as trackmen, the exceptions so few as to be negligible. Roadmasters are instructed to keep in close touch with labor conditions and to make note of promising talent for future foremen among the laborers. In this work he is materially assisted by the foremen. Inquiry is made as to age, habits, educational qualifications and industrial ability. For self-evident reasons it is considered a good feature if the individual is married. After the man is picked out, effort is made to instruct him in maintenance of way work and to retain him in the service. This is not an easy matter, for with a limited time allowance during the winter months, and more comfortable environments in other forms of employment, the test is severe. It is an encouragement to the laborers to know that promotion comes from the ranks, and this is stimulating in that it provides something definite for attainment. The knowledge that efforts will not pass unnoticed serves as an impetus for honest effort in the right direction.

The embryonic foreman is given every opportunity to demonstrate his talent and to pick up knowledge of the work. His foreman allows him to handle certain work and treats him as an assistant. Incidentally, it should be remarked that a change in the organization, instituting the position of assistant foreman, would be a decidedly progressive step in the development of the system. The candidate gradually becomes imbued with a feeling of confidence and self-reliance, and the transition from a laborer to a foreman is not severe.

As an indication of the success of the system during the first four years of its practice, there have been 20 section foremen appointed, and of this number 16 have been successful, two failures, and the other two were appointed without regard to the system. Under the general principles of this system two roadmasters and a master carpenter have been appointed, who are efficiently performing their duties.

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.



Brown Rail Unloader for the New York Central Lines.

TESTS AND THEIR RELATION TO ECONOMY.

By C. Clay,
Atchison, Topeka & Santa Fe, East Las Vegas, N. M.

While some roads are making systematic tests of a few important materials with a view to economy, there are a number of materials and tools in the use of which a saving could be made if proper care was exercised to ascertain their efficiency. A requisition is made for a track jack. It arrives and is placed in use. Possibly the purchasing agent has bought this jack from a new firm, but it rarely occurs to the roadmaster or foreman to note that it is of a different make and to watch its performance to see whether there is a saving or a loss in its use as compared with the old style. No actual observations of work performed are kept. A track man may remember that an article was in use and that it appeared to be a little better than another, but he could not make a definite statement. As another instance, when it is decided to relay rails, on too many roads no definite record is kept of the performance of the old rails and the date of laying the new. While some roads are working to improve this condition, on many divisions it is safe to say that no such record is kept. It takes a certain amount of time to pay detailed attention to these matters, but it pays. If the saving on the wear of one track jack is but a matter of ten cents, a great saving might be effected where a considerable amount of money is spent each year for these tools. In some cases, however, efficiency might be sacrificed for length of life and in such case the increased cost of operation would offset the saving in wear.

I have asked how long a frog would last at a given point, and have received very indefinite answers which practically gave no information at all. If the life of the material and the name of the maker had been noted, these answers might have been very different. The aim of almost every roadmaster and section foreman is to place his track in the best possible condition and so maintain it, but the feature of economical maintenance is too frequently overlooked. Very few officers can say exactly what it will cost to do a certain piece of work. Estimates for the same piece of work are entirely different on different roads and on different divisions of the same road. A section foreman almost always says he "thinks" he can do a piece of work in a certain time, but he does not "know." It never occurred to him to remember how long it took him to do the same thing before.

One class of ties may be better adapted to one particular point than another, but definite records for determining this are not yet kept on all roads. Rock from one crusher may hold up better than that from another and not crumble so quickly. Definite data as to this should be collected. In a costly material like rock a saving can be effected even when a longer haul is necessary, if the more available material is a poor class and crumbles quickly. It is the same way with riprap for revetment work. One class of rock may be found to last longer than another and yet both may come from quarries within a short distance of each other. Naturally it would be useless to obtain this data and then not preserve it carefully or in convenient form. All information gained should be carefully compiled in a properly indexed book.

A test may, of course, be carried too far and result in a loss instead of an economy. For instance, rails should only be left in the main line until they are fit for average branch line traffic, then their life on the branch should be until they are in condition to make good side track rails. If they are left in the main track or branch track until they become scrap some of their life is lost and in addition they become a source of danger. The question is often raised as to whether it is cheaper to leave rail in the main track until it is only fit for side tracks, or to take it out when fit for average branch line traffic and afterwards use it on side tracks, but one seldom hears a definite statement made which is backed by cost data.

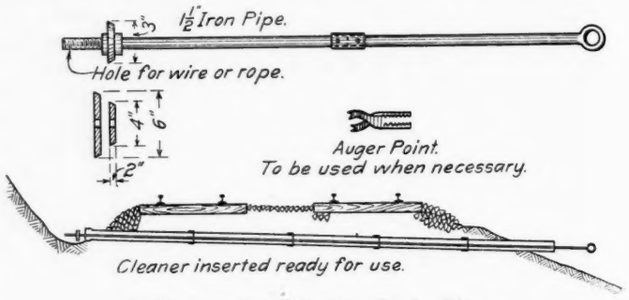
It would appear that an economy might be effected by all roads joining and forming a central bureau of tests to which each would contribute its share of the cost of maintenance proportionate to the mileage of the road. Each road could send the data as to its tests to this bureau for compilation and distribution. Thus a small road that could not afford to make extensive tests might obtain through this bureau the maximum amount of information at a minimum cost.

A PIPE CLEANER.*

By W. E. Davin,
Supervisor, Pittsburgh & Lake Erie, McKees Rocks, Pa.

Drain pipes under tracks very often get clogged up with sediment and soft mud and it is frequently necessary to dig up the pipes and clean them out. This involves much labor and expense and it is often necessary to support the tracks on a temporary trestle or stringers while the pipes are taken out and cleaned.

A simple arrangement for cleaning drain pipes, shown in the sketch, consists of one or more joints of iron pipe with a handle



A Scraper for Cleaning Drain Pipes.

at one end and threaded at the other end and several round wood scrapers of various sizes. The rod is forced through the sewer, a small round scraper is then put on and the rod withdrawn. This makes a small opening. The scraper is removed, the rod forced through the sewer again and a larger size scraper is put on. The operation is repeated until the sewer is cleaned. After the first time through, a rope or wire is attached to the scraper end of the rod to assist in pulling it back.

A UNIVERSAL SAFETY MOVEMENT.†

By O. C. Spieth,
Cleveland Division, Baltimore & Ohio.

A large portion of the daily work of the employees of the maintenance of way department of any railroad is to make track safe and a faithful and intelligent track foreman with willing men should constitute the best safety committee on roadway and track. In the same way the bridge and carpenter foreman and his men would make a good committee on bridges and structures. The divisional committees should be augmented by a sub-committee taking in each section foreman and bridge foreman with the divisional maintenance of way committeeman as chairman.

Usually we look to the foreman for the safety of his men and if the instructions and rules for the governing of employees while working on tracks and in dangerous places are faithfully carried out a large percentage of the danger is eliminated. The foreman should also give instructions on handling of tools and material. At the monthly meetings of the sub-committees attention could be called to all dangerous practices and methods studied to remedy them, as well as taking up suggestions for eliminating dangerous conditions in roadway, tracks and structures. The writer believes that by such departmental sub-divisions good results can be obtained, as each sub-committeeman can again have a committee composed of his own men, and thus soon all employees would be gathered into the "Safety First" movement.

*Received in the contest on Tools, which closed August 25, 1912.
†Received in the contest on Safety, which closed October 25, 1912.

General News.

Complying with the federal regulation forbidding common towels, the Baltimore & Ohio is to provide paper towels in its stations and on its trains.

At Tunis, Algeria, December 18, R. G. Garros, a French aviator, soared to a height of 19,032 ft., his flight lasting one hour and eleven minutes. The best previous record of height in a flying machine was 17,881 ft.

The New York State Civil Service Commission, Albany, will hold examinations January 11 for numerous state positions, including junior railway engineer for the Public Service Commission, first district (New York City), salary $901 to $1,200.

Near Wilkesbarre, Pa., last week three train wreckers were arrested by railroad detectives who had been camping in the woods for six weeks looking out for the culprits. There had been eight attempts to derail passenger trains in that region.

Senator Jonathan Bourne, of Oregon, has been elected chairman of the joint Congressional commission to promote Federal aid to states in construction of highways; Representative Shackelford vice-chairman, and A. W. Prescott, of Oregon, secretary.

A preliminary announcement of the Wisconsin State Tax Commission shows an increase in the assessment of railways in the state from $325,085,000 to $326,600,000. In accordance with a law passed by the last legislature, railroad terminals are excluded from these figures and are taxable locally.

The Interborough Rapid Transit Company has appropriated $42,000 as a fund for Christmas presents for employees. A five dollar gold piece will be given to each employee receiving less than $110 a month, except in the cases of men who have entered the service since the beginning of the present year.

President Taft has appointed the members of the Commission on Industrial Relations ordered by Congress at the last session. Its president is Senator George Sutherland, of Utah, and the railroad men on it are F. A. Delano, president of the Wabash, and A. B. Garretson, chief of the Order of Railroad Conductors.

The Central Safety Committee of the St. Louis & San Francisco has compiled a statement of casualties for the month of November, 1912, as compared with 1911, showing a decrease in the total number of casualties from 464 to 334, or 28 per cent. Casualties to employees decreased from 399 to 257, or 36 per cent.

A bill is to be introduced in the Connecticut legislature to provide that there shall be two engineers on the locomotive of every fast express train. The bill has the backing of the labor unions. The same interests are working for a full crew bill, it is said; also a workmen's compensation act and an employers' liability bill.

The coroner who investigated the recent collision on the Cincinnati, Hamilton & Dayton at Irvington, near Indianapolis, has submitted a report placing the blame for the accident on Willis York and Carl Gross, the engineman and head brakeman of the freight train which was struck by a passenger train running through a misplaced switch.

At a grade crossing in Ashtabula, Ohio, on Monday evening last eight persons were killed, and seven were injured, when a street car was struck by a very heavy freight train of the Lake Shore & Michigan Southern. The sudden stopping of the freight train wrecked several cars, and the wreck of the street car was buried under many tons of coal.

The Chicago, Burlington & Quincy has issued an order prohibiting employees from cashing their pay checks in saloons and has made arrangements with banks to keep open evenings at the time the pay checks are distributed, in order to handle this business. One saloon keeper in Aurora is said to have cashed over $15,000 worth of checks in a single night.

Representatives of the New York Central Lines have asked a reduction of $16,982,832 in the valuation of the property of these lines in Ohio as fixed by the state tax commission. The total valuation for the New York Central Lines was placed by the commission at $147,289,670. The railway representatives asked a reduction of $7,390,273 in the valuation of the Lake Shore & Michigan Southern, which was $57,276,460.

The Pere Marquette monthly magazine contains a strong appeal to employees to exercise care in the handling of freight, for the purpose of reducing the increasing number and amount of freight loss and damage claims. The article contains a tabulation showing the amount of money paid on this account during the fiscal year 1912, as follows: For each minute, 34 cents; for each hour, $20.43; for each day, $490.40; for each month, $14,916.48; for the year $178,997.71.

The United States Civil Service Commission announces examinations January 22 for the position of tariff clerk under the Interstate Commerce Commission at a salary of $1,200 a year. It is understood that there will be numerous vacancies. Applicants must be thoroughly familiar with freight classifications, tariffs and divisions, or passenger tariffs and divisions; and must have a good general education. On sufficient notice, candidates will be examined in any one of a large number of cities and towns all over the country.

The Western Union Telegraph Company has established schools of telegraphy at its offices in a number of cities; that is to say, messenger boys, clerks and others who wish to learn to operate are provided with a room for practice and have the guidance of a teacher specially assigned to that work. In New York City the Western Union has announced to its employees that the company has arranged to secure for them reduced rates for seats at a prominent theater, where an unusual spectacular play is being given.

W. M. Barrow, assistant attorney general of Louisiana, and formerly secretary of the railroad commission of that state, proposes to have a commission to examine conductors, flagmen and brakemen of passenger trains. There is a law calling for such an examining board and Mr. Barrow will ask the commission to put this law in effect. The examining board must be composed of a member of the railroad commission, a representative of the railroad whose employees are to be examined, and a third member to be selected by these two.

That rice can be grown successfully, on a commercial scale, in California has been demonstrated by the first crop now being harvested near Richvale in the Sacramento valley. The Southern Pacific Company reports that the 1,500 acres planted early this spring are yielding 5,000 lbs. per acre, or 3,750 tons for the district. This crop is a new one for California and adds an important product to the already long agricultural list of the West. At Richvale, the Richvale Land Company has built 32 miles of ditch and is constructing 18 miles more. The company owns 600 acres, and individuals 900 acres. For the next season, almost double the present acreage will be under cultivation.

C. H. Venner & Company, of New York, the Continental Security Company, and others, representing stockholders of the Lake Shore & Michigan Southern and the Michigan Central railroads, have filed with the Ohio Public Service Commission a protest against approval by the commission of the equipment trust certificates which these roads desire to issue to the amount of $24,000,000. It is charged that the New York Central, in violation of the anti-trust law, is controlling the two roads named, which are parallel lines, in its own interest, and to the detriment of Lake Shore and Michigan Central stockholders. It is charged that the property to be bought with the proposed securities is to be used for the benefit of the New York Central chiefly. Mr. Venner has figured in many law suits attacking railroads and railroad management.

Two Erie Police Officers Killed.

In a riot of striking laborers in the yard of the New York, Susquehanna & Western on the west side of the Hudson river, opposite 109th street, New York City, December 11, two police officers were killed and eight or ten others were injured. About 200 Italian and Polish coal handlers, who had struck a few days before because of the refusal of the company to advance their pay from 20 cents to 25 cents an hour, had gathered on the high bluff above the railroad yard to watch for strike breakers. When they saw a boat load of new men coming to the dock they rushed

down the steep sides of the cliff and attacked the guards in the yard almost without warning, using shotguns and rifles, the strikers being able to conceal themselves in the brush. The officers had only pistols with which to defend themselves. The yard had to be guarded many days following this disturbance.

Disastrous Collision in Italy.

A press despatch of December 16, from Messina, Italy, reports a butting collision between a passenger train and a freight, near that city, in which 25 passengers were killed. A day car, between a sleeping and a dining car, was crushed to splinters.

A Hundred Freight Cars Burnt Up.

In a fire which caught from burning grass at Belmont, Mass., near Boston, on the Boston & Maine, last week Tuesday, 100 freight cars were destroyed, the cars and contents being valued at $200,000. The cars, making a string nearly a mile long, stood on a track adjacent to a swamp where it was impossible for the city fire engines to get near them, and the fire had been raging a long time before water was turned on to any part of it. The firemen had available only one line of hose, which had to be stretched across a half mile of swamp. The yardmaster succeeded in getting switching engines with which he saved a good number of cars, but 75 or more were blazing before any water was played on the fire.

Organized Courtesy.

The railway owes to those who make use of its lines a service which it can only render if every employee is brought to feel that his actual employer is the daily-shifting mass of fellowmen who buy tickets and ride on them.

What the road owes to these travelers—in safety, in comfort, in service as scheduled, in courteous treatment—every individual member of the operating force equally should feel to be his own personal duty.

Personal responsibility—that is the thing!

Just as the man who computes stresses and strains in the engineering department; the structural steel worker who does honestly his part of the bridge-building; the alert, faithful track-walker; the signal-man, engineer, fireman, conductor, trainman, oiler, switchman—every man of us all is personally responsible to the company, to the traveler, and to his own conscience for the safety of those who ride by rail, so, every railway worker who comes into human contact with the traveling public is personally responsible for the comfort of those we all serve.

And, by the same token, a traveler, to be comfortable, must have comfort of mind as well as of body. Thus every railway worker is bound by his personal duty to accord to every man woman and child whom he meets that courteous treatment which means fullest satisfaction.

When the time comes, as it will and must, when every member of the operating force appreciates his personal responsibility in these particulars, the service will have reached a degree of smoothness and efficiency which the management is determined to attain.—*Monthly Bulletin of the Traffic Department, Chicago & North Western.*

Annual Report Texas Railroad Commission.

The twenty-first annual report of the Texas Railroad Commission shows that on June 30, 1912, there were 14,940 miles of main line and branches on the 101 roads in the state, an increase of 615 miles for the year. The total outstanding capitalization was $548,155,945, or an average of $36,696 per mile. The gross earnings for the year were $102,781,530, an increase of 3.89 per cent.; operating expenses, $81,718,122, an increase of 7.09 per cent. The cost of construction and equipment to June 30 is given as $534,068,136, an increase of $48,320,813 during the year. The income account shows a deficit of $7,243,288, on which the commission comments as follows:

"We presume that it will be understood that this sum is the aggregate for all the railroad companies listed in the table from origin of each of them, down to June 30, 1912, of their deficiency of earnings to meet the combined sum of their operating expenses, in interest on their excessive bonded indebtedness (for large amounts of which the railroad companies received nothing which they can show), other interest paid to the 'system' which dominates them to a considerable extent and did so to a greater extent in the past, deficits produced by extravagant managements at times and by errors in judgment in selecting the wrong locations for lines, and the millions of dollars paid toward finishing the construction and equipment of lines after they had been received from the construction companies in an unfinished and poorly equipped condition."

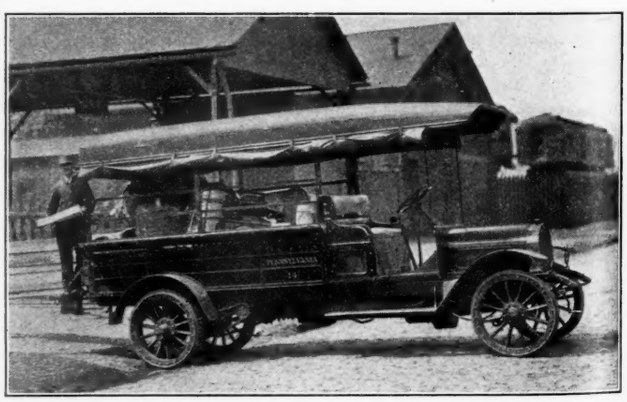
No Power to Order the Establishment of a Sinking Fund.

The New York State Public Service Commission, First District, has modified its order of February 1 requiring the New York Railways Company and the Third Avenue Railway Company to set aside each year a specified amount of money as an amortization fund to make up the difference between the value of the property and the securities issued by the companies in their respective plans of reorganization. In the case of the New York Railways Company, the amount ordered set aside for amortization was $108,000 each year plus 4 per cent. upon all prior payments until the fund shall amount to $16,500,000. In the case of the Third Avenue Railway Company, the amount to be set aside was $180,000 plus 4 per cent. upon all prior payments until the fund shall amount to $25,000,000. These amounts of $16,500,000 in the case of the New York Railways Company, and $25,000,000 in the case of the Third Avenue Railway Company were the sums respectively, the commission held, by which the proposed security issues exceded the value of the property. The orders just issued modified the previous orders by cancelling the requirement for the establishment of this amortization fund in the case of each company, on the ground that under the law, the commission, while satisfied of the necessity for providing such amortization funds, was not warranted in ordering the companies to provide them. The provisions of the orders issued in February as to the approval of the security issues provided in the plan of reorganization of each company, as well as the provisions for depreciation, are allowed to stand.

Motor Trucks Everywhere.

Seventy or more different makes of motor trucks and delivery wagons will be exhibited at the Thirteenth National Automobile Show to be held in New York City from January 11 to 25. The management has secured the use of the new Grand Central Palace in addition to Madison Square Garden. All of the exhibition space on the three levels in both buildings will be completely filled.

Gasoline and electric delivery wagons and trucks are coming into use rapidly throughout the country. In Massachusetts the



Type of Truck Used by the Pennsylvania at Harrisburg.

registrations increased from 2,189 on September 1, 1911, to 3,560 on the same date in 1912—an increase of 62 per cent. In Washington, D. C., there are now 500 motor trucks and wagons where a year ago there were 218, and in Los Angeles, where there were 70 a year ago, there were nearly 1,300 on November 1, 1912. In Chicago 2,094 trucks were registered in September as compared with 800 in May, 1911. There are estimated to be 50,000 in use in America. The Adams Express Company is now using 485 motor wagons in different cities and the American 352. The

five leading express companies have 968 in service. Burns Brothers, New York City, have 21 ten-ton coal trucks.

The accompanying illustration, from a photograph, shows a motor truck belonging to the Pennsylvania Railroad. The company has a number of motor trucks in service, the bodies of which were built in the company's shops. One of these is in use at the Broad street station, Philadelphia, for transferring supplies to and from storehouses and from the numerous freight stations of the company in the vicinity of Broad street. Others are in use at the shops in West Philadelphia, Harrisburg and Olean.

Discipline of Enginemen.

[Letter from J. O. Fagan, in New York *Times*.]

The commission reports the direct cause of the Westport derailment as a disregard by the engineman of the train of signals and rules provided to prevent the occurrence of such accidents. Now the record of this man indicates that he was one of those unfortunate men who could not obey orders; in other words, he was a careless "runner." Within a year after being made an engineer he was discharged for being responsible for a collision. Inside of four years after again being made an engineer he was again disciplined for passing a home signal at danger, but apparently he was allowed to remain in the service. Again, in 1905, seven years later, we find him doing the same thing, until finally, in 1912, at Westport, he came to grief for the last time.

How did this man manage to remain in the service in the face of his unsatisfactory record? The American people would like to know just how careless men in general are handled and taken care of on the railroad today.

Will the changing of crossovers or of rules relating to speed answer the question or remedy the evils? Will the substitution of steel for wooden coaches make a particle of difference, so far as the primary cause of accidents is concerned? May not the people say to the Interstate Commerce Commission: "We notice you have carefully and elaborately investigated the rumor that pressure by managers is being brought to bear on engineers to keep their trains as nearly as possible on schedule time, with emphasis even on a minute. Now, then, have you also investigated the much more important rumor that for years pressure of the most palpable nature has been brought to bear on managers to compel them to retain in the service the careless and indifferent workmen? If you have not done this, don't you think you had better get on to your job?"

As a body American railroad men are probably the best equipped for their duties and the most reliable among industrial workers in this country. But hanging over them, night and day, is the problem of the careless or inefficient man. So far as the train service is concerned, in him today is concentrated the safety problem on American railroads.

A manager of one of the largest railroads said to a committee of labor men, "Look here, you need not go to the legislature with this 'full crew bill.' Just tell me on what train or trains the extra men are necessary, and I will put them to work at once." The answer was substantially as follows:

> You don't seem to understand what we are driving at. The extra men may not be necessary on your system, but they are in Virginia, and we propose to standardize legislation all over the country, just as we have already standardized the *pay roll and the qualifications of the men.*

When you standardize qualifications the careless man simply takes his turn with the perfectly reliable man, and the leaven of this principle from one end of the United States to the other is demoralizing the railroad business. It is absolutely useless to moralize the situation at the top if we allow it to be demoralized in this way at the bottom.

The Interstate Commerce Commission calls on the railways to unite to reduce harrowing disasters. . . . That word "unite" sticks in my crop. The arbitrary and persecuting attitude of the Interstate Commerce Commission toward the railroads has long ago banished all chance for co-operation between these two apparently conflicting interests. . . . In its relation to the railroads the Interstate Commerce Commission is neither humane, reasonable, nor polite, and any idea of co-operation, even in the interests of public safety, under such circumstances, is out of the question.

The federal government has undertaken to regulate almost everything connected with the railroad business. The same authority, that is to say, the Interstate Commerce Commission, should now go to work and examine and license those employees who are directly concerned in the operating of the trains. . . .

Safety in Railroad Travel.

[From the *Evening Post*, New York.]

When J. O. Fagan writes on railroad accidents, what he says is pretty sure to make interesting reading. He declares, in effect, that the direct cause at Westport was not this particular disregard of rules, but the system under which such disregard is constantly tolerated and men habitually guilty of it retained in the service. He cites the bad previous record of the engineman who was killed, and says that the lack of real discipline exemplified in this particular case is not exceptional, but general. . . . The commission has failed to investigate the "far more important" allegation "that for years pressure has been brought to bear on managers to compel them to retain in the service the careless and indifferent workmen."

That Mr. Fagan's views are in all respects sound we are far from prepared to say. When he asserts that the commission should now go to work and examine and license employees in the same way as those who operate vessels on the sea are licensed he opens up a vista full of perplexity. There is no comparison between the problems in point of complexity and difficulty. But in again directing attention to the part played by trade-union action in obstructing the operation of wholesome discipline Mr. Fagan is doing a public service. That it needs looking into, and that the Interstate Commerce Commission has not completed its task until it has done so, is plain.

But Mr. Fagan overstates the point. However serious may be the part played by trade-union dictation in the matter, it is by no means the only source of the evil, nor is it impossible for the railroad managers to secure great improvement in safety without waiting for the suppression of trade-union pressure. . . . The report of the commission gives the New Haven Company a clean bill of health on one matter which has been a conspicuous part of the arraignment against the company that has figured in the newspapers. "The roadway and track conditions in the vicinity of the accident are good," says the report, "and the construction of the cross-over was substantial. . . . But its verdict in regard to the larger questions relating to safety is very severe, and fixes upon the management a kind of blame which cannot be shifted. The warnings made by the commission on the earlier occasion had been almost wholly ignored by the company in the interval. . . . And even as to the better enforcement of the existing rules, surely something more might have been done than has been done without inviting any serious clash with the powers of trade-unionism.

Moreover, as to the relation between the railroads and the unions concerning this matter, we are inclined to think that much might be accomplished by a bold policy of frankness and publicity. If the companies are submitting to injurious pressure, which results in paralyzing their efforts to secure the lives of their passengers, we do not believe that they are helpless. The excuse for such submission resembles the excuse that so long was current among corporations generally for submitting to legislative blackmail. A little heroic resistance, an open appeal to the public, might involve some inconvenience and temporary loss, but it would result in emancipation for themselves and in immeasurable gain to the commonwealth. The railroads are not compelled to wait for an investigation by the Interstate Commerce Commission to disclose the situation. A plain statement to the public would quickly bring the pressure of public sentiment to bear in favor of whatever disciplinary measures are necessary to make life and limb safe for travelers.

The Commerce Court.

Members of Congress seem to be agreed that the Commerce Court will go out of existence on March 4, the determination of the House majority to make no appropriation for the court beyond that date having been adhered to in spite of the arguments presented by the minority.

The *Wall Street Journal* comments on the action of the lower house of Congress as follows:

"It looks as though the House of Representatives were deter-

mined to carry out its cheap political maneuver of abolishing the Commerce Court. That the Commerce Court is dear to the heart of President Taft was, of course, one of the chief grounds upon which the House leaders took their high and statesmanlike stand.

"But the theory of the Commerce Court is so fundamentally right, and it is so essential to the adjustment of the distressingly large number of controversies arising between shippers and communities on the one hand and the carriers on the other, that the institution which a half turn of the political wheel of fortune threatens with extinction will eventually be erected on quite as permanent a base as that of any other court in the country.

"It is of course to be regretted that the Commerce Court put such a broad interpretation upon its powers and functions as to sharply antagonize the Interstate Commerce Commission and the commission's many friends in Congress, and to draw the contradiction of the Supreme Court in the first half dozen cases appealed. But that was no cause for alarm. . . . The action of the House asks the country to go back to the old, intolerable practice of conducting interstate commerce litigation before thirty different judges of the United States Circuit Court. It means a loss of two to five years in getting a case tried. The House leaders are not actually in favor of such a backward step; they have plotted to strangle the present court only in order that the next Congress may re-establish one and the Democratic President appoint its members."

Safety Committees on the Pennsylvania.

The Pennsylvania Railroad has not made much use of trumpets in connection with its safety committee work; but the committees' doings have been highly effective, though quiet.

At a recent meeting of the employees of the New York division of Jersey City the number present was about 1,300—all that the hall would hold. Three employees who came to the meeting had to be turned away. It is not every railroad division that could furnish 1,300 employees, off duty, to attend a meeting on a single evening and without running any special trains. The New York division is an institution of considerable magnitude in itself.

The safety committee on this division has no officer of the company on it. The chairman, J. O. Young, is a locomotive engineman. Superintendent J. B. Fisher, however, was the leader at the Jersey City meetings and it is evident that any employee who thinks that because the committee has on it no officer of the company the work does not receive the support and attention of the officers finds that view mistaken. On the other hand, a committee composed wholly of men taken " from the ranks" is in a position to disarm the suspicions of those who may think that the committee work is managed too exclusively as an affair of the "bosses," without a sympathetic regard for the workmen.

Mr. Young uses a camera and spends a large part of his time on the committee work. Another member, also a locomotive runner, H. J. Fackenthall, also gives a large share of his time to this work. Mr. Fackenthall gives most of the lectures, having special qualifications as a speaker. He is not exactly what would be called a "spellbinder," but is a man who, unlike many railroad men, takes pains to put into the most effective form whatever he has to say.

The material of the lectures or talks on this division is in general the same as that used by committees on other roads heretofore noticed in the *Railway Age Gazette*. As elsewhere, the camera and the stereopticon screen are prominent features. Mr. Young uses the stereopticon for abstract as well as concrete discussions. He shows on the screen some of the rules of the standard code, and also extracts from the time-table rules. The first two paragraphs of the "general notice" in the standard code have been taken as the text of a little lecture which has proved profitable with all classes of employees. Rule G, prohibiting the use of intoxicating liquors, is emphasized in this way. Other rules which have been put into lantern slides are numbers 15, 27, and 102. The special instructions accompanying the time-table of the New York division fill 60 pages, not to mention 50 more pages containing illustrations and diagrams of block and interlocking signals, and many of these rules are used on the screen to give point to admonitions or advice of the lecturers. To get a thousand men to read the same rule at the same time has an effect that most people do not appreciate until they see the thing done.

In their talks to the men on the observance of fixed signals, the members of the New York division committee are making use of the signal instruction car, a car specially fitted up to explain signal aspects and containing, on a long table, a continuous diagram of the road, by means of which the explanation of peculiarities in local conditions is made easy.

The New Haven and the Grand Trunk.

The federal grand jury at New York City has continued its inquiry into the affairs of these two roads, the most prominent witnesses heard this week, besides managing and financial officers of the two roads, having been George H. Curtis, president of the O'Brien Construction Company, which did work on the Southern New England, and H. C. Estep, engineer of that road.

The proposal of Congressman O'Shaunessy, of Rhode Island, that the affairs of the New Haven and the Grand Trunk be investigated by Congress, which was backed by numerous prominent interests in New England, who sent a large company of representatives to Washington, is still in the hands of the House Committee on Rules; and members of that committee, who have been quoted as rather disinclined to start a Congressional investigation, while the government is acting through its law department, indicate that they will render no decision until some time in January.

Louis T. Brandeis, of Boston, has come out with a newspaper article, filling a page, presenting arguments in favor of his proposition that the state or states should take control of the railroad properties.

President Mellen, in a letter to the *Boston American,* complaining of the unfair treatment accorded him by that paper, intimated that Mr. Brandeis was the prime mover in the recent attacks on the New Haven and Boston & Maine roads.

Mr. Mellen has published two additional advertisements headed "The Truth." "Number 2" tells of the action of the road in ordering changes in crossovers, to comply with the order of the Connecticut commission. It says that had the Westport crossover been a No. 20, the speed limit for which is 25 miles an hour, "the result would have been the same." Attention is called to the fact that compliance with the commission's order at present imposes additional stops between New York and Boston sufficient to delay through trains twelve minutes. The New York *Evening Post* had published a statement to the effect that the three fast trains from Boston—scheduled through in five hours—had been late, on the six days of one week, an average of about fifteen minutes each train. Mr. Mellen says that lengthening of time on his road—as has been done with the 18-hour trains between New York and Chicago—is unnecessary, in view of the fact that his "roadbed and rails are unsurpassed for solidity of construction in the United States," but that the schedules of the five hour trains may be lengthened—not more than fifteen minutes—on account of the stops at crossovers.

"The Truth, No. 3," deals with the question of automatic train stops. Referring to the recommendation of the Interstate Commerce Commission Mr. Mellen says:

"The accidents at Bridgeport and at Westport were exact duplicates. The engineers violated the rules and went to their death. . . Let us not blame them. Let us all co-operate to eliminate human error by mechanical device. The inventive genius of mankind has never yet paused before any public need. The need of the present, to more thoroughly safeguard life on even the best built and best equipped railroads, is that which the Interstate Commerce Commissioners recommend—an automatic train device that shall set the air brakes or close the steam throttle, or both, when a train fails to stop for signals." Continuing, he offers a reward of $10,000, to be paid on the order of the Interstate Commerce Commissioners and the Railroad Commissioners of Massachusetts and the Public Utilities Commissioners of Connecticut, "to whomever shall first invent an automatic device that will safely arrest an express steam locomotive that has passed danger signals; the test of efficiency to be its adoption within the year 1913, 1914 or 1915 by the New Haven road, the New York Central, or the Pennsylvania, and its approval or recommendation by the Interstate Commerce Commissioners."

Representative Victor L. Berger, the socialist member from Wisconsin has introduced in Congress a bill to condemn the property of the New York, New Haven & Hartford and provid-

ing for its purchase by the government. The bill proposes that Congress instruct the secretary of commerce and labor to ascertain and report the actual value of the railroad's property, the estimate to be used as a basis for its acquirement.

NEW HAVEN TRACKS SAFE.

C. C. Elwell, chief engineer of the Connecticut Public Utilities Commission, has inspected the track of the New Haven road between the New York State line and New Haven, and reports as follows:

"The roadbed in general was found to be in excellent condition, well ballasted, and true as to line and grade.

"A number of defects were found which were noted and located. None of these are of such extreme character as to be pronounced immediately unsafe or dangerous."

Then follows a description of each defect and the recommendations for changes. The inspection was made by three engineers working under Mr. Elwell's direction. Each foot of roadbed was inspected.

It is understood that the New York Public Service Commission is conducting a similar inspection.

Exhibition Run of Drake Gas-Electric Car.

A demonstration run of the Dracar, the gas-electric car, built by the Drake Automotrice Company, Chicago, was made last Friday and Saturday over the lines of the Chicago & Eastern Illinois and the Chicago Great Western. The car was one of those recently ordered by the Missouri, Oklahoma & Gulf, and was taken directly from the shops of the St. Louis Car Company at St. Louis, and brought to Chicago over the C. & E. I., and taken thence to Oelwein, Iowa, over the C. G. W., and back to St. Louis. W. J. Jackson, vice-president of the C. & E. I., together with press representatives, went to Momence, Ill., and rode into Chicago with the car. The car was inspected by representatives of the C. G. W., the Illinois Central, the Wabash and other roads. W. A. Garrett, vice-president; J. G. Neuffer, superintendent of motive power; F. W. Stubbs, mechanical engineer of the C. G. W., and others, rode the car from Chicago to Stockton, Illinois, from which point it was sent back to St. Louis. The party was much pleased with the operation of the car and remarked upon its riding qualities as well as its operation. This car was described in the *Railway Age Gazette* of November 15. There are three now in actual service on the Missouri, Oklahoma & Gulf, one of which traveled 2,872 miles during the month of November, with total receipts of $1,205 between the towns of Muskogee, Okla., and Henryetta. The car averaged three miles per gallon of gasolene during the month. It was placed on regular steam train schedule and averaged 23 m. p. h., including stops. On the demonstration run from St. Louis to Chicago the average consumption was 2½ gallons per mile. The car weighs 65,000 lbs., but is not designed for hauling a trailer, although designs will soon be made for more powerful cars. The special feature of this car is that it is light, that the gas engine may be started by cranking, and that it may be operated from either end. The car was under perfect control of the motorman, and speed was accelerated readily. In the present instance the car operates at 600 volts, and the amperes varied between 70 and 80. A maximum speed during the demonstration run of over 30 m. p. h. was observed.

Steel Corporation's Unfilled Tonnage.

The report of the United States Steel Corporation shows that on November 30 the unfilled tonnage was 7,852,883 tons, an increase of 258,502 tons over the previous month. The unfilled tonnage on October 31, 1912, was 7,594,381 tons; on September 30, 1912, 6,551,507 tons, on August 31, 1912, 6,163,375 tons, and on November 30, 1911, 4,141,955 tons. The increase in unfilled tonnage in November is regarded as satisfactory, although the increase in the previous month was a little more than 1,000,000 tons. Most of the orders placed in November must have been for delivery in the second and third quarters of next year, as the corporation is booked so far ahead that it is forced to refuse orders for early delivery. Shipments were at the rate of about 43,000 tons a day during November, and orders for new business at the rate of about 53,000 tons a day compared with the daily average of orders of nearly 80,000 tons in October. The unfilled tonnage on the books of the Steel Corporation on November 30, has been exceeded only three times, namely, March 31, 1907, when it was 8,043,858 tons; December 31, 1906, when it was 8,489,718 tons, and September 30, 1906, when it was 7,936,884 tons.

Firemen's Wages.

At one of the conferences between the committee representing the eastern railways and the locomotive firemen's leaders in New York City, the firemen withdrew their demand for time-and-a-half pay for overtime, and modified their demand for extra firemen on all engines. Following that conference a recess was taken that the railways might calculate the difference which would be effected in the aggregate additions to their pay rolls by the change in the demands. At the meeting on Tuesday of this week Elisha Lee, chairman of the committee representing the managers, handed to the firemen a written statement saying that "many features of your requests seem to be susceptible of satisfactory solution and agreement; the request involving the establishment of a uniform rule requiring two regular firemen upon every engine carrying a weight upon its drivers equal to or greater than a specified minimum, with train or without in other than passenger or yard service, or two regular firemen on a class of lighter engines making in excess of 100 miles, is unreasonable and involves expenses not contemplated in your request."

Mr. Lee said that to meet the original request of the firemen the roads would have to add to their expenses $20,800,000; and that under the changed terms of the request the amount required would still be large, namely, $15,134,000, which is equal to 56 per cent. of the firemen's present wages. Mr. Carter, head of the firemen, had said that the changes which he had made would reduce the aggregate demands to only $4,000,000. Continuing, Mr. Lee said:

"It is recognized that under certain conditions firemen should have assistance, and in many cases the eastern railroads are giving it. . . In no case should an employee in any class of service be expected or permitted to perform service which will require excessive physical effort. The question of providing assistance should be decided only after a careful study of conditions surrounding individual runs.

"The committee feels that after having heard and considered your request that two firemen be placed upon engines of a weight upon drivers equal to or greater than a specified minimum practically regardless of conditions, you should be advised that the conference committee of managers cannot accept this proposition, but if you are willing to waive this feature of your requests the conference committee is prepared to settle the working conditions regarding terminal delay, overtime, time held at other than home terminals, etc., on the same basis as laid down in the award of the recent engineers' arbitration; and to consider an increase of existing rates in some instances."

On Wednesday of this week Mr. Carter submitted a revised request calling for two firemen on about 2,000 engines (instead of on 5,000, as before, or 13,000 as at first). If the roads will not grant this, he suggests arbitration under the Erdman Act.

Electrification of Swiss Railways.

The electrifying of the Swiss State Railways is a question that has been occupying the attention of the federal council for several years. The fact that Switzerland produces no coal makes the cost of fuel for operating steam roads an important item in government expenditures, and the further fact that the mountain streams make available a vast amount of water power for the generation of electricity, has encouraged the serious consideration of the proposition to electrify the railways. Water power in Switzerland is also under government control. Several commissions have been appointed to investigate and report upon the practicability of the scheme, and the most feasible plan of changing the system. After a thorough investigation of the subject and some experiments, the commission has reported in favor of a single-phase alternating current with a pressure of 15,000 volts in the overhead wires. The first work to be undertaken in the application of electricity for propelling power in the state railways will be in the St. Gotthard route, where there are many steep grades and numerous tunnels, the longest of which is over nine miles. The change is especially desirable on this line as it will eliminate the disagreeable passage through many long tun-

nels filled with smoke. It is estimated that the cost of conversion of the entire government system, aggregating 1,700 miles, will be something like $14,000,000, including water power for electrical generation, while the cost of operation would be reduced about 10 per cent. as compared with steam power.

New York Railroad Club.

The Christmas entertainment of the New York Railroad Club will be held on December 20, under the direction of W. J. Harahan, vice-president of the club. The program will include an informal dinner of the executive committee at the Republican Club, at which there will be about 110 railroad officials and supplymen. There will be no speeches. After the dinner the party will adjourn to the United Engineering Societies' building, where there will be music and a vaudeville entertainment, followed by a supper. Between 1,100 and 1,200 members and guests are expected to be present at the vaudeville.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, December 18, two papers were presented for discussion, as follows: Prevention of Mosquito Breeding, by Spencer Miller, M. Am. Soc. C. E.; and The Sanitation of Construction Camps, by Harold Farnsworth Gray, Jun. Am. Soc. C. E. These papers were printed in the *Proceedings* for November, 1912.

Western Railway Club.

At the regular monthly meeting of the Western Railway Club, held December 17, O. S. Beyer, Jr., of the Rock Island Lines, presented a paper entitled Railway Specifications.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May 6-9, St. Louis, Mo.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Annual meeting, June 17-20, Buffalo, N. Y.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec, Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meteing, May 21, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-23, 1913, Montreal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Convention, June 11-13, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, January 21-23, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June, 1913, Atlantic City, N. J.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg. Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, June 18, Bluff Point, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual meeting, May, 1913, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, Chicago & North Western, Escanaba, Mich.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Annual meeting, August 18, Richmond, Va.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Convention, June 16-18, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Annual meeting, September 9-12, Ottawa, Can.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo. Next meeting, August 12-15, Nashville, Tenn.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Meetings, March 17, Chicago; June 10-11, New York; convention, October 14, Nashville, Tenn.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Annual convention, May 19-21, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Convention, September 8-12, 1913, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St., Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala. Next meeting, April 17, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago. Annual meeting, June 17, Los Angeles, Cal.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, August, 1913, Chicago.

UTAH SOCIETY OF ENGINEERS.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The State Railroad Commission of Georgia has called upon the governor of the state to bring suit against the Seaboard Air Line for violation of a rule of the commission which gives shippers the right to route their freight.

The potatoes dug in Aroostook County, Me., this year amounted to 13,000,000 bushels. In one day recently the Bangor & Aroostook delivered to the Maine Central at Northern Maine Junction, 100,000 bushels of potatoes. The farmers get for these about $1.25 a barrel.

Seventy-five cars loaded with Buick automobiles recently left Flint, Mich., for the Pacific coast. The cars carried 375 automobiles valued at $482,400. The shipment was routed west of Chicago over the Rock Island, the Union Pacific and the Southern Pacific. The freight charges will approximate $32,000.

The Chicago & North Western, in connection with several commercial clubs, has engaged the services of Professor E. W. Hunt for the week beginning December 16, to deliver a series of lectures on dry farming and soil conditions in western Nebraska and Wyoming. The lectures will be given from a special train, or in the largest buildings obtainable at points where the train stops.

The Southern Pacific and other railroads entering California, Arizona and Nevada have just announced one-way colonist rates to points in those states for the spring of 1913. The sale dates from the East will be March 15 to April 15, on the same basis as in effect last fall. Ten day stop-overs will be allowed in New Mexico, Utah, Arizona, Nevada and California not exceeding 30 days from the date of sale. From Omaha, Council Bluffs and Kansas City the rates will be $30; from Chicago, $38; and from St. Louis and New Orleans, $37. Nearly one million people have been brought to California by the Southern Pacific Company alone on these rates, and they have been one of the greatest factors in increasing California's population.

P. H. Burnett, industrial commissioner of the Lehigh Valley, finding that large quantities of farm produce were lost during the past season because it was impossible to get it to market in season, is visiting the farmers along the line with a view to encouraging the establishment of co-operative store houses, with facilities for refrigeration. At Geneva, N. Y., and Wysox, Pa., he expects to see buildings put up in the near future. Thousands of dollars worth of cabbages and onions went to waste this last autumn, the crops being so heavy that cabbages, for example, were sold at $2.50 a ton, whereas last spring they sold for twenty times that price and next spring probably will be again high. No possible increase of transportation facilities could provide in a satisfactory way against this loss.

The Oregon-Washington Railroad & Navigation Company and the Spokane, Portland & Seattle have filed petitions in the federal district court at Portland, asking an injunction restraining the enforcement of the freight rate law adopted by the people of Oregon at the recent election. The law establishes percentage relationships between the various classes of freight rates and between carload and less than carload rates. Judge Wolverton, while denying an immediate restraining order, set a hearing for December 16, at which the defendants, members of the state railroad commission, the attorney general, and the district attorneys, will be called on to show cause why such an order should not be issued. The petitions allege that the law is in conflict with orders of the Interstate Commerce Commission and interferes with interstate traffic. Examples of the effect of the rates required by the law were presented to show that they would be detrimental to a large number of cities in the state and in adjacent states. The railways have made no attempt to comply with the provisions of the law.

Suspensions of freight rates ordered by the Interstate Commerce Commission, involving as they do very long delays because of the large number of such cases coming before the commission to be dealt with, have caused railroad men much inconvenience as well as loss; but in the case of the baggage regulation—making an extra charge for trunks more than a certain number of inches long—this governmental delay now seems to trouble some people outside of railroad circles. According to a press despatch which recently went the rounds, there is "demoralization in the trunk industry throughout the United States" as a result of the uncertainty as to what is to be the charge for long trunks when the present disagreement as to the tariff shall have been settled. The burden of expense which will have to be borne by the traveling public, if the railroads are allowed to make an extra charge for trunks over 40 in. long, is declared to be "enormous." One of the arguments offered in favor of carrying long trunks free is that the human race is growing taller! In view of this profound fact, small trunks, it is declared, are coming to be looked upon by most people as useless. They must have a traveling wardrobe.

The Parcel Post.

The Postmaster-General has notified the postmasters in the principal cities to report on January 15 the volume of matter presented for transmission in the parcel post, with an estimate of the additional cost of caring for the new department. Emergency allowances in lump sums have been made to the principal cities and the postmasters have been given certain authority to employ temporary clerks and carriers to handle the increased volume of business.

The regulations governing the parcel post allow perishable articles to be sent through the mails under certain restrictions. Butter, lard, fish, fresh meats, dressed fowls, vegetables, fruits, berries and similar articles likely to decay quickly may be sent short distances, when securely packed. Eggs will be accepted for local delivery when packed properly in a container; and for any distance when each egg is separately packed in a perfectly secure manner.

No restriction is placed on the mailing of salted, dried, smoked or cured meats, but fresh meat will be transported only within the first zone.

Fragile articles, including millinery, toys, musical instruments and articles of glass in whole or in part, must be securely packed and marked "fragile."

Articles that may not be sent by parcel post include intoxicating liquors of all kinds; poisons; reptiles; explosives; inflammable articles, including matches; pistols; disease germs, etc.; live or dead animals, or birds or live poultry; raw hides or pelts; or anything having a bad odor.

Books and printed matter may not be forwarded at parcel post rates, but only at the pound rate of third class mail matter.

The Committee on Railway Mail Pay, Ralph Peters, chairman, has written to the House committee on post offices and post roads suggesting that, pending further legislation, Congress should at once pass a joint resolution to provide for having the mails weighed annually, and simultaneously throughout the country, the weighing to be continued for 35 days, instead of 105 days as now, and the pay to be based on such weight beginning on January 1, when the parcel post system will go into effect. The committee points out that under the contracts for carrying the mails which are now in effect the railroads would not be obliged to accept packages weighing more than four pounds each.

In connection with its campaign of publicity, to inform the people generally, concerning the inequitable basis on which the railways are now paid for carrying the mails, the committee has issued a statement to the effect that agents of the post office department riding free, and not in charge of mail, have been granted free transportation at the rate of fifty million passenger miles a year.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association in presenting statistical bulletin No. 133, giving a summary of car surpluses and shortages by groups from August 16, 1911, to November 30, 1912, says: The total surplus on November 30, 1912, was 26,135 cars; on November 21, 1912, 22,363 cars; on December 6, 1911, 53,840 cars. Compared with the preceding period; there is an increase in the total surplus of 3,772 cars, of which, 940 is in box, 1,342 in flat, 1,432 in coal and 58 in miscellaneous cars. The increase in box car surplus is shown in groups 3 (Ohio, Indiana, Michigan and Western Pennsylvania), 4 (the Virginias and Carolinas), 6 (Iowa, Illinois, Wisconsin and Minnesota),

8 (Kansas, Colorado, Oklahoma, Missouri and Arkansas), 9 (Texas, Louisiana and New Mexico), and 10 (Washington, Oregon, Idaho, California, Nevada and Arizona). The increase in flat car surplus is general throughout the country, except in group 9 (as above). The increase in coal car surplus prevails throughout the country, except in groups 4 and 9 (as above). The increase in miscellaneous car surplus appears in groups 3, 4 (as above) 7 (Montana, Wyoming, Nebraska and the Dakotas), 9 and 10 (as above).

The total shortage on November 30, 1912, was 62,536 cars; on November 21, 1912, 73,475 cars; on December 6, 1911, 17,697 cars. Compared with the preceding period; there is a decrease in the total shortage of 10,939 cars, of which 4,284 is in box, 412 in flat, 5,394 in coal and 849 in miscellaneous cars. The decrease in box car shortage is general, except in groups 4 and 6 (as above), and 11 (Canadian Lines). The decrease in flat car shortage is shown in groups 1 (New England Lines), 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania), 3, 8, 9, 10 and 11 (as above). The decrease in coal car shortage is general except in groups 4 and 10 (as above). The decrease in miscellaneous car shortage is chiefly in groups 2, 3, 4, 6, 7 and 9 (as above).

Compared with the same date of 1911; there is a decrease in the total surplus of 27,705 cars, of which 5,549 is in box, 1,693 in flat, 13,063 in coal, 7,400 in miscellaneous. There is an increase in the total shortage of 44,839 cars, of which 26,466 is in box, 3,845 in flat, 9,965 in coal and 4,583 in miscellaneous cars.

The accompanying table gives car surplus and shortage figures by groups for the last periods covered in the report and totals for the country for corresponding dates in previous years; and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1912.

Cotton Crop.

The crop reporting board of the bureau of statistics of the United States Department of Agriculture estimates that the total production of cotton in the United States for the season of 1912-13, will amount to 6,612,335,000 lbs. (not including linters), equivalent to 13,820,000 bales of 500 lbs., gross weight.

The estimated production, with comparisons, by states, follows:

STATES.	Pounds Lint. 1912.	Bales of 500 lbs., gross weight. 1912.	1911. (Census)	Average 5 yrs. 1906-1910. (Census)
Virginia	11,443,000	24,000	29,891	12,064
North Carolina	418,630,000	878,000	1,075,826	627,668
South Carolina	565,123,000	1,184,000	1,648,712	1,085,893
Georgia	812,738,000	1,701,000	2,768,627	1,782,160
Florida	32,728,000	68,000	83,388	56,158
Alabama	636,006,000	1,330,000	1,716,534	1,187,707
Mississippi	530,656,000	1,109,000	1,203,545	1,400,153
Louisiana	208,104,000	435,000	384,597	526,481
Texas	2,324,120,000	4,850,000	4,256,427	3,172,218
Arkansas	408,895,000	854,000	939,302	856,703
Tennessee	134,064,000	280,000	449,737	300,867
Missouri	28,261,000	59,000	96,808	51,456
Oklahoma	497,265,000	1,039,000	1,022,092	783,796
California	4,302,000	9,000	9,790	.....
All other	.....	.....	7,425	3,946
United States	6,612,335,000	13,820,000	15,692,701	11,847,270

Car Balance and Performance.

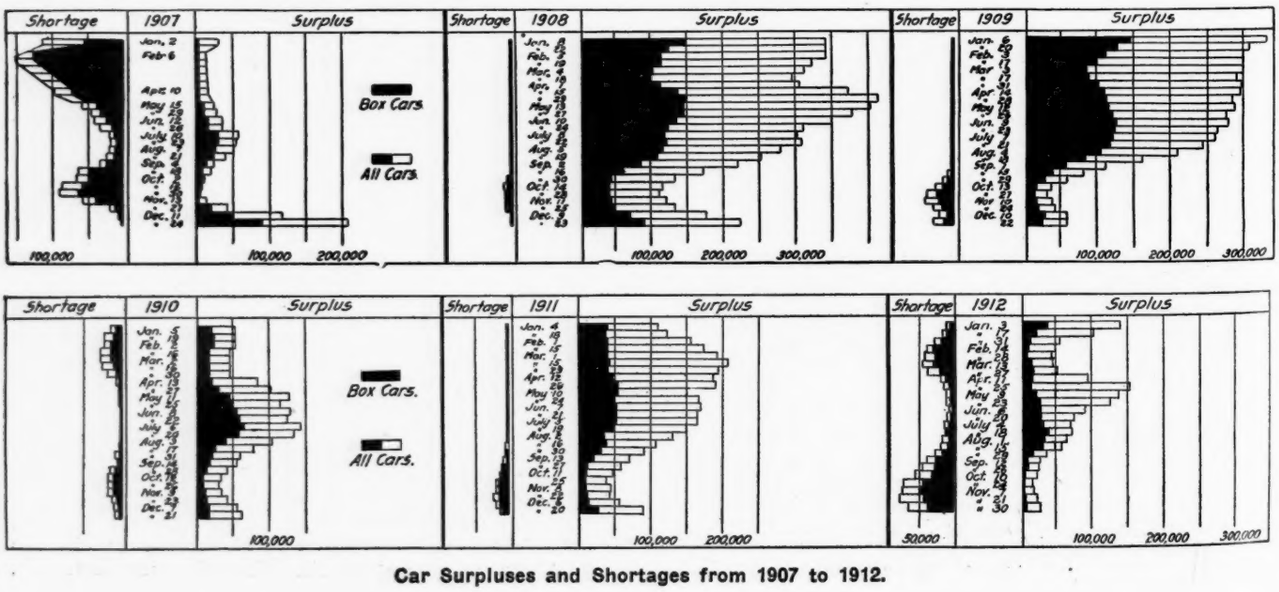
Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 134, covering car balance and performance for August, 1912, says:

The miles per car per day, including surplus cars, increased 6.1 per cent. over the figure for August, 1911, the figure being

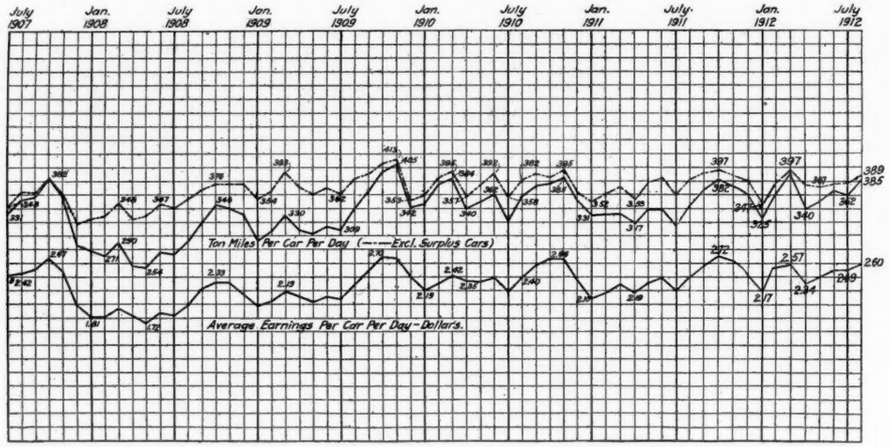
CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—November 30, 1912	7	0	300	0	48	348	728	256	568	608	2,160
" 2.— " 30, 1912	27	687	50	1,091	128	1,956	3,054	40	1,884	548	5,526
" 3.— " 30, 1912	31	54	185	220	639	1,098	6,227	61	2,791	1,339	10,418
" 4.— " 30, 1912	10	218	24	530	508	1,280	3,191	1,052	4,047	488	8,778
" 5.— " 30, 1912	23	7	0	148	233	388	5,048	1,623	1,510	192	8,373
" 6.— " 30, 1912	26	2,392	324	2,175	1,971	6,862	4,334	503	1,193	1,249	7,279
" 7.— " 30, 1912	4	28	163	90	341	622	362	0	50	0	412
" 8.— " 30, 1912	16	46	226	1,045	1,000	2,317	3,009	329	319	525	4,182
" 9.— " 30, 1912	13	1,074	145	260	535	2,014	1,436	195	99	248	1,978
" 10.— " 30, 1912	22	880	1,287	2,040	4,506	8,713	3,341	101	317	864	4,623
" 11.— " 30, 1912	6	96	215	0	226	537	7,993	222	0	592	8,807
Total, November 30, 1912	185	5,482	2,919	7,599	10,135	26,135	38,723	4,382	12,778	6,653	62,536
" December 6, 1911	169	11,031	4,612	20,662	17,535	53,840	12,277	537	2,813	2,070	17,697
" " 7, 1910	159	16,795	3,885	10,781	22,454	53,915	5,435	1,093	3,199	2,174	11,901
" " 10, 1909	176	26,989	6,488	6,848	17,145	57,470	7,713	757	5,927	4,196	18,593

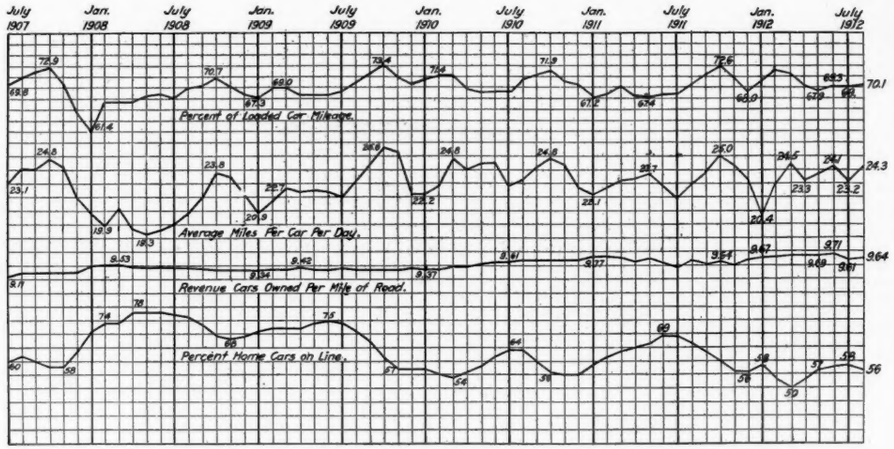
*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages from 1907 to 1912.



Freight Car Mileage and Earnings, 1907-1912.



Freight Car Performances, 1907-1912

FREIGHT CAR BALANCE AND PERFORMANCE IN AUGUST, 1912.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	84,947	688,281	216,404	190,837	174,007	394,719	17,462	141,271	27,293	143,209	119,080	2,197,510
Average number of system cars on line	43,842	369,607	125,266	98,462	89,977	263,674	5,070	71,199	19,020	70,656	78,556	1,235,329
Railway-owned cars: Average foreign on line	43,963	278,008	103,706	63,353	62,125	170,426	12,001	59,568	23,579	59,276	56,813	932,818
Total Railway-owned cars on line	95,887	647,615	228,972	161,815	152,102	434,100	17,071	130,767	42,599	129,932	135,369	2,176,229
Excess	2,858	*40,666	12,568	*29,022	*21,905	39,381	*391	*10,504	15,306	*13,277	16,289	*29,363
Per cent. of cars on line to total owned:												
Home	51	54	58	52	52	67	29	50	70	50	66	56
Foreign	52	40	48	33	35	43	69	38	86	41	48	43
All railways	103	94	106	85	87	110	98	88	156	91	114	99
Private cars on line	4,280	43,632	13,060	2,830	6,682	16,308	2,368	11,294	4,114	12,064	3,179	119,811
Total, all cars on line	100,167	691,247	242,032	164,645	158,784	450,408	19,439	142,061	46,713	141,996	138,548	2,296,040
Per cent. of cars in shop	8.58	6.01	9.12	7.65	9.91	6.45	7.40	8.34	6.06	5.73	6.32	7.21
No. of freight engines owned	1,359	10,365	3,094	3,375	2,817	6,412	527	2,731	754	3,116	1,988	36,538
Average cars on line per freight engine owned	74	67	78	49	56	70	37	52	63	46	70	63
Total freight-car mileage	56,474,577	521,006,761	172,397,655	129,804,378	125,219,603	329,584,170	30,381,773	100,953,078	29,484,300	137,255,739	99,299,499	1,731,861,533
Average miles per car per day	18.2	24.4	22.8	25.4	25.5	22.6	52.0	24.0	20.2	31.2	23.1	24.3
Per cent. loaded mileage	73.9	68.7	71.3	68.3	73.2	70.8	69.3	72.1	73.5	71.6	74.5	70.1
Ton-miles of freight, including company freight	670,345,788	8,910,755,769	3,113,366,396	2,226,576,535	1,845,521,823	3,500,421,967	421,193,488	1,176,857,779	380,425,613	1,991,176,568	1,466,807,033	25,703,448,759
Average ton-miles, including company freight												
Per car-mile	11.9	17.3	19.1	17.2	14.8	14.3	14.2	12.4	12.9	14.8	14.8	15.8
Per loaded car-mile	16.1	25.1	26.8	25.1	20.2	20.0	20.5	16.0	17.6	20.7	19.8	22.3
Per car per day	216	421	435	436	376	324	739	299	261	460	342	385
Gross freight earnings	$7,553,456	$52,311,506	$16,387,774	$12,435,235	$12,121,562	$33,729,081	$3,436,194	$12,651,977	$3,491,557	$20,189,460	$10,637,954	$184,945,756
Average daily earnings: Per car owned	$2.58	$2.45	$2.44	$2.10	$2.25	$2.76	$6.35	$2.79	$4.09	$4.57	$2.88	$2.70
Per railroad car on line	2.49	2.61	2.31	2.48	2.57	2.51	6.49	3.12	2.62	5.03	2.53	2.74
All cars on line	2.40	2.44	2.18	2.44	2.46	2.42	5.70	2.87	2.39	4.60	2.48	2.60

*Denotes deficiency.

24.3 in August, 1912, compared with 23.2 in July. The figure for August, 1912, is the largest of which we have record for any preceding month of August. The figure for August, 1911, was 22.9.

Ton miles per car per day was 385 in August, 1912, compared with 362 in July; this is an increase of 10.0 per cent. over the figure for August, 1911, which was 350. The proportion of home cars on line was 56 per cent. compared with 58 per cent. in July. This figure for August, 1911, was 67 per cent. There is an increase (1.1 per cent.) in the percentage of loaded car mileage compared with July, 1912. This figure for August, 1911, was 69.6 per cent. The average earnings per car per day were $2.60, compared with $2.49 in July. There is an increase of 8.4 per cent. over the earnings for August, 1911, which were $2.39.

The accompanying table gives car balance and performance in the month covered by the report and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

FINAL CROP ESTIMATES.

The final estimates of the crop reporting board of the bureau of statistics of the United States Department of Agriculture indicate the acreage, production and value (based on prices paid the farmers on December 1) of important farm crops of the United States in 1912, 1911 and 1910 to have been approximately as follows:

CROPS.	Acreage.	Production.	Farm Value, December 1.	
			Per Bu.	Total.
	Acres.	Bushels.(§)	Cents.	Dollars.
Corn, 1912	107,083,000	3,124,746,000	48.7	1,520,454,000
Corn, 1911	105,825,000	2,531,488,000	61.8	1,565,258,000
Corn, 1910	104,035,000	2,886,260,000	48.0	1,384,817,000
Winter wheat, 1912	26,571,000	399,919,000	80.9	323,572,000
Winter wheat, 1911	29,162,000	430,656,000	88.0	379,151,000
Winter wheat, 1910	27,329,000	434,142,000	88.1	382,318,000
Spring wheat, 1912	19,243,000	330,348,000	70.1	231,708,000
Spring wheat, 1911	20,381,000	190,682,000	86.0	163,912,000
Spring wheat, 1910	18,352,000	200,979,000	88.9	178,733,000
All wheat, 1912	45,814,000	730,267,000	76.0	555,280,000
All wheat, 1911	49,543,000	621,338,000	87.4	543,063,000
All wheat, 1910	45,681,000	635,121,000	88.3	561,051,000
Oats, 1912	37,917,000	1,418,337,000	31.9	452,469,000
Oats, 1911	37,763,000	922,298,000	45.0	414,663,000
Oats, 1910	37,548,000	1,186,341,000	34.4	408,388,000
Barley, 1912	7,530,000	223,824,000	50.5	112,957,000
Barley, 1911	7,627,000	160,240,000	86.9	139,182,000
Barley, 1910	7,743,000	173,832,000	57.8	100,426,000
Rye, 1912	2,117,000	35,664,000	66.3	23,636,000
Rye, 1911	2,127,000	33,119,000	83.2	27,557,000
Rye, 1910	2,185,000	34,897,000	71.5	24,953.000
Buckwheat, 1912	841,000	19,249,000	66.1	12,720,000
Buckwheat, 1911	833,000	17,549,000	72.6	12,735,000
Buckwheat, 1910	860.000	17,598,000	66.1	11,636,000
Flaxseed, 1912	2,851,000	28,073,000	$1.15	32,202,000
Flaxseed, 1911	2,757,000	19,370,000	$1.82	35,272,000
Flaxseed, 1910	2,467,000	12,718,000	$2.32	29,472,000
Rice, 1912	722,800	25,054,000	93.5	23,423,000
Rice, 1911	696,300	22,934,000	79.7	18,274,000
Rice, 1910	722,800	24,510,000	67.8	16,624,000
Potatoes, 1912	3,711,000	420,647,000	50.5	212,550,000
Potatoes, 1911	3,619,000	292,737,000	79.9	233,778,000
Potatoes, 1910	3,720,000	349,032,000	55.7	194,566,000
Hay, 1912	49,530,000	*72,691,000	°$11.79	856,695,000
Hay, 1911 (a)	48,240,000	*54,916,000	°$14.29	784,926,000
Hay, 1910 (a)	51,015,000	*69,378,000	°$12.14	842,252,000
Tobacco, 1912	1,225,800	†962,855,000	‡10.8	104,063,000
Tobacco, 1911	1,012,800	†905,109,000	‡9.4	85,210,000
Tobacco, 1910	1,366,100	†1,103,415,000	‡9.3	102,142,000

§Bushels of weight. *Tons (2,000 lbs.). °Per ton. †Pounds. ‡Per pound.
(a) Revised; adjusted to Census figures for tame or cultivated hay for 1909.

Caboose Laws.

The special committee on relations of railway operation to legislation, W. J. Jackson, chairman, Chicago, has issued a bulletin (No. 43) containing the text of the laws which have been passed in sixteen states prescribing the construction of caboose cars and an analysis of those laws. The states in question are Arkansas, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, North Dakota, Ohio, South Dakota, Virginia, Washington and Wisconsin. The law of Arkansas goes into effect on January 1, next; and those of Indiana, Nebraska and North Dakota go into effect June 1, 1914; the others are now in effect. The analysis made by the committee sets forth the terms of each law in relation to the height of cars; length, strength, trucks, platforms, doors, steps, cupolas, windows, etc. For example, under the head of length it appears that Arkansas prescribes 24 ft. including the platform; nine other states prescribe 24 ft. excluding the platform, and Missouri prescribes 28 ft. excluding the platform. Five states make no provision as to length. Iowa prescribes a platform 18 in. wide; Nebraska one 20 in. wide; Arkansas, Indiana, North Dakota, Ohio and South Dakota, 24 in. wide. Illinois and Missouri 30 in. wide. Five states say nothing about the width of the platform; one (Michigan) requires the width to be approved by the state commission. Minnesota and Virginia prescribe penalties for disobedience of the law from $10 to $50; seven other states fix the penalty at $100 to $500, and three make it from $500 to $1,000. Four states say nothing about penalty.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended certain items in tariffs of the Chicago, Burlington & Quincy, the Chicago Great Western, the Illinois Central, the Minneapolis & St. Louis, the Missouri Pacific and a tariff published by William Cameron, Agent, which cancel the joint rates with the Chicago, Ziegler & Gulf Railway for the transportation of coal from mines on that road in Illinois to all destinations. Heretofore, under existing joint rates, the Chicago, Ziegler & Gulf has received a division of $1 per car. The effect of the suspended items is to eliminate this division or allowance to the Chicago, Ziegler & Gulf.

At the instigation of the railroad commission of South Carolina the commission will make an inquiry into the practices, rules and regulations of certain carriers governing the issuance, sale and exchange of passenger mileage books in South Carolina and other states applicable to interstate transportation, with a view to ascertain whether the rules, regulations and practices of those carriers with respect to mileage books are just and reasonable or are discriminatory with respect of interstate as compared with intrastate travel, or are otherwise unlawful. The carriers may file their statements on or before December 20, 1912.

The commission has suspended from December 10 until April 9 the items in the tariff of R. H. Countiss, agent, which cancel joint rates for the transportation of lumber from points on the Washington Western to points on or reached via the Great Northern, the Northern Pacific and the Chicago, Burlington & Quincy. The Washington Western is a line about 11 miles long in the western part of the State of Washington. Lumber shipped from points on that line to eastern destinations now takes the so-called Coast rates. The cancellation of joint rates with this line would cause shippers thereon to pay rates in excess of the Coast rates by 4 and 4½ cents per 100 lbs.

Potato Rates Not Advanced.

In re investigation and suspension of advances in rates by carriers for the transportation of potatoes in carloads from points in South Dakota, Nebraska and other states to St. Louis, Mo., Peoria, Ill., Chicago, and other points. Opinion by Chairman Prouty:

The proposed advances range from ½ cent to 8 cents per 100 lbs. The commission found, however, that the proposed rates are unreasonable and ordered that the present rates should apply for the future. (25 I. C. C., 247.)

Rates on Cotton Seed Products Not Advanced.

In re investigation and suspension of advances in rates by carriers for the transportation of cotton seed products from Oklahoma City, Okla., and other points to points in Texas and other interstate points. Opinion by Commissioner McChord:

The commission found that the proposed increased rates on cotton seed products from Oklahoma points to stations in Texas and on inedible tallow from Oklahoma points to Louisville, Ky., Cincinnati, Ohio, and Hammond, Ind., were not shown to be reasonable by the defendants. The defendants were directed to withdraw the suspended supplement. The commission gave its permission to the defendants to file new rates on the group basis provided that short hauls were properly provided for. (25 I. C. C., 237.)

REVENUES AND EXPENSES OF RAILWAYS.

FOUR MONTHS OF FISCAL YEAR, 1913.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor	292	$460,142	$221,293	$727,813	$88,584	$90,770	$16,395	$242,145	$31,952	$469,846	$257,967	$1,027	$55,720	$203,274	—$39,384
Arizona Eastern	366	638,283	148,380	834,370	83,903	50,936	10,369	199,438	33,519	378,165	456,205	296	35,386	421,115	177,728
Atlanta & West Point	93	212,681	175,338	426,356	57,984	74,572	21,354	136,307	20,085	310,302	116,054	732	22,709	94,077	—24,751
Baltimore & Ohio—System	4,455[1]	27,198,205	5,948,842	35,105,889	4,981,776	6,121,477	655,266	11,708,681	660,369	24,127,569	10,978,320	—291,844	921,487	9,764,989	314,065
Baltimore & Ohio Chicago Terminal	77	.....	9,151	646,803	92,081	92,629	2,799	259,954	17,573	465,036	181,767	3,704	76,461	109,010	57,358
Boston & Maine	2,244[2]	9,887,608	6,583,301	17,740,296	2,112,547	2,432,451	154,842	7,361,908	388,492	12,450,240	5,290,056	72,848	700,643	4,662,261	989,886
Buffalo & Susquehanna *R. R.*	265	550,160	36,927	603,829	120,183	88,939	5,163	198,276	23,582	436,143	167,686	.....	8,800	158,886	54,488
Buffalo & Susquehanna *Ry*	91	173,409	45,105	228,714	41,913	110,374	2,064	88,013	10,565	252,929	—24,215	138	6,000	—30,077	—13,049
Butte, Anaconda & Pacific	46	337,244	57,708	432,995	64,487	84,619	3,023	196,056	12,357	360,542	72,453	.....	8,000	64,453	—11,939
Carolina, Clinchfield & Ohio Ry. Co	238	740,770	68,785	828,326	57,272	78,381	27,578	139,288	27,078	329,597	498,729	.....	32,000	466,729	124,006
Carolina, Clinch. & Ohio Ry. Co. of S. C.	18	39,090	6,887	47,000	2,906	328	4,123	9,683	1,559	18,599	28,401	.....	2,000	26,401	6,134
Central of Georgia	1,915	3,014,953	1,406,067	4,823,265	672,663	839,922	139,132	1,578,751	160,172	3,390,640	1,432,625	26,335	205,800	1,253,160	—115,752
Central Vermont	411	928,828	479,552	1,522,381	200,069	230,548	35,758	696,126	31,812	1,194,313	328,068	1,760	48,800	281,028	—85,615
Chesapeake & Ohio Lines	2,315[3]	9,291,479	2,240,103	12,056,323	1,506,997	2,407,020	221,197	3,502,007	263,975	7,901,196	4,155,127	15,774	408,620	3,762,281	—28,724
Chicago & Alton	1,026	3,577,884	1,614,646	5,582,134	753,745	1,092,673	165,191	1,808,875	125,814	3,946,298	1,635,836	—7,006	152,000	1,476,830	—11,283
Chicago & Erie	270	1,538,638	274,804	1,980,062	383,265	395,005	82,692	926,303	42,836	1,830,101	149,961	—4,807	52,019	93,135	—122,448
Chicago, Burlington & Quincy	9,074	22,536,809	8,524,276	33,967,735	4,042,244	5,351,908	553,168	9,792,483	891,460	20,631,263	13,336,472	—32,686	1,113,017	12,190,769	1,859,617
Chicago, Indiana & Southern	359	1,271,835	117,904	1,434,880	200,247	373,490	33,823	453,018	32,646	1,093,224	341,656	3,914	59,000	286,570	150,228
Chicago, Indianapolis & Louisville	617	1,634,076	637,920	2,484,746	358,104	304,987	72,337	868,845	61,134	1,665,407	819,339	.....	93,593	725,746	—34,557
Chicago Junction	12	.....	.....	677,744	81,380	42,376	5,061	301,777	14,522	445,116	232,628	.....	8,683	223,945	21,900
Chicago, Milwaukee & Puget Sound	2,081[4]	6,208,563	1,135,133	7,600,651	687,050	777,331	196,367	2,156,221	90,134	3,907,103	3,693,548	66,536	300,000	3,460,084	1,147,741
Chicago, Milwaukee & St. Paul	7,511	17,553,352	6,028,418	25,918,521	3,354,935	3,316,953	466,737	8,989,790	293,427	16,421,842	9,496,679	61,233	941,727	8,616,185	3,418,616
Chicago, Peoria & St. Louis	255	462,966	135,692	628,478	91,059	132,110	28,054	268,234	22,293	541,750	86,728	.....	17,200	69,528	—12,759
Chicago, Rock Island & Gulf	477	778,295	233,771	1,082,593	158,252	96,546	41,685	362,653	31,482	690,618	391,975	—2,642	29,961	359,372	17,430
Chicago, Terre Haute & Southeastern	351	572,103	76,187	664,446	130,459	131,854	11,870	201,359	29,931	505,473	158,973	—852	40,000	118,121	—51,064
Cincinnati Northern	245[5]	417,908	89,258	530,652	89,184	89,348	10,478	197,713	13,387	400,110	130,542	.....	21,200	109,342	27,776
Cleveland, Cincinnati, Chic. & St. Louis	2,012[6]	7,985,870	3,019,109	11,985,690	1,419,828	2,003,739	279,617	4,200,890	224,270	8,128,344	3,857,346	440	380,000	3,477,786	340,117
Delaware & Hudson Co.—R. R. Dept	854[7]	6,746,221	1,363,249	8,385,266	701,978	1,084,398	102,454	2,705,086	215,944	4,809,860	3,575,406	—54,471	195,098	3,325,837	167,922
Denver & Rio Grande	2,554[8]	6,630,736	2,155,915	9,199,312	1,391,919	1,550,550	201,075	2,807,446	234,607	6,185,597	3,013,715	26,340	295,000	2,745,055	411,330
Denver, Northwestern & Pacific	215	303,130	161,039	484,365	72,807	67,483	8,327	135,348	14,413	298,378	185,987	.....	14,000	171,987	—28,818
Detroit & Toledo Shore Line	79	432,293	.....	434,082	78,865	24,695	4,593	116,256	9,333	233,742	200,340	.....	18,600	181,740	18,374
Detroit, Grand Haven & Milwaukee	191	486,000	260,000	853,916	258,289	100,778	27,848	393,091	19,615	799,621	54,295	—91	11,812	42,392	—175,992
Detroit River Tunnel	2	.....	.....	386,045	8,209	11,328	.....	32,502	91	52,130	333,915	.....	18,000	315,915	2,667
Detroit, Toledo & Ironton	441	502,418	64,153	611,537	108,586	57,672	10,831	258,104	21,088	456,281	155,256	—11	24,000	131,245	42,870
Duluth & Iron Range	274[9]	3,930,239	80,324	4,049,974	365,918	274,226	4,643	724,624	43,073	1,412,484	2,637,490	19,172	188,739	2,467,923	—87,448
Duluth, Missabe & Northern	351[10]	4,323,596	153,734	4,512,938	352,789	354,576	8,008	729,765	43,700	1,488,838	3,024,100	21,498	215,396	2,830,202	221,805
El Paso & Southwestern Co	902	2,284,499	327,594	2,739,932	265,586	365,889	50,545	703,215	95,545	1,480,780	1,259,152	—7,014	88,952	1,163,186	413,042
Elgin, Joliet & Eastern	823[11]	4,046,135	28	4,398,222	460,296	650,352	18,320	1,095,800	63,104	2,287,872	2,110,350	.....	84,332	2,026,018	648,014
Erie	1,988[12]	14,061,034	3,597,196	19,045,106	2,373,079	3,122,639	380,668	5,898,038	332,478	12,106,902	6,938,204	15,871	568,475	6,385,600	534,255
Florida East Coast	642[13]	589,214	371,173	1,107,695	272,892	203,802	20,008	465,147	41,507	1,003,356	104,339	—4,604	63,000	37,735	18,980
Fort Worth & Denver City	454	1,159,788	586,585	1,831,347	146,615	295,556	31,509	563,736	56,878	1,094,294	737,053	—1,720	46,800	688,533	—25,387
Galveston, Harrisburgh & San Antonio	1,338	2,987,447	1,046,291	4,232,086	332,813	873,728	123,752	1,509,811	121,437	2,961,541	1,270,545	—20,376	139,651	1,110,518	23,984
Georgia, Southern & Florida	395	417,715	281,596	802,978	90,463	168,024	30,525	325,242	38,084	652,338	150,640	.....	42,504	108,136	—51,751
Great Northern	7,712[14]	22,223,827	5,628,127	29,640,546	4,312,069	3,110,138	388,211	7,115,444	431,678	15,357,540	14,283,006	128,185	1,275,485	13,135,706	1,226,817
Gulf & Ship Island	308	470,752	150,842	669,161	95,299	121,685	10,389	184,941	33,714	446,028	223,133	.....	20,262	202,871	17,072
Gulf, Colorado & Santa Fe	1,596[15]	3,383,824	1,139,930	4,780,168	733,464	657,103	93,753	1,567,333	120,681	3,172,334	1,607,834	.....	161,742	1,446,092	572,311
Hocking Valley	352[16]	2,328,780	361,151	2,888,074	301,213	551,231	34,931	785,742	57,629	1,730,746	1,157,328	.....	148,800	1,008,528	132,135
Houston, East & West Texas	191	309,393	124,603	458,345	73,697	56,144	8,523	144,778	14,893	298,035	160,310	.....	15,856	144,454	—13,545
Houston & Texas Central	789	1,661,600	696,232	2,503,912	252,761	385,935	72,917	905,048	66,970	1,684,631	819,281	—5,862	80,174	733,245	67,478
Illinois Central	4,763	14,327,569	4,856,353	22,027,692	3,310,378	4,842,872	453,574	8,152,127	510,936	17,269,887	4,757,805	—44,619	951,000	3,762,186	196,056
Indiana Harbor Belt	105[17]	.....	.....	1,042,797	118,033	133,795	10,923	407,769	23,951	694,471	348,326	14,446	22,240	340,532	103,564
International & Great Northern	1,160	3,093,740	973,708	4,299,300	507,678	514,521	103,432	1,524,559	121,656	2,771,846	1,527,454	—9,165	120,000	1,398,289	.....
Kanawha & Michigan	177[18]	1,030,938	140,651	1,196,315	160,407	185,411	8,891	325,535	25,025	705,269	491,046	—86	36,907	454,053	—22,445
Lake Erie & Western	886	1,685,455	351,610	2,150,097	310,787	363,944	50,074	750,996	44,748	1,520,549	629,548	.....	82,034	547,514	39,383
Lake Shore & Michigan Southern	1,873[19]	12,762,322	4,674,932	19,495,169	2,516,539	3,106,465	316,414	5,677,406	307,147	11,923,971	7,571,198	109,830	580,000	7,101,028	409,471
Lehigh & Hudson River	97	579,373	19,264	608,755	102,963	85,374	5,053	198,690	16,146	408,226	200,529	.....	16,000	184,529	16,693
Lehigh Valley	1,453[20]	12,917,727	1,917,205	15,337,040	2,064,339	2,495,522	330,073	4,502,653	256,240	9,648,827	5,688,213	—46,756	470,000	5,171,457	953,187
Louisiana & Arkansas	255	426,008	82,782	529,733	90,895	85,939	10,088	145,570	19,667	352,159	177,574	.....	16,236	161,338	52,131
Louisiana Western	208	480,439	217,755	730,225	69,612	116,075	27,873	220,697	22,615	456,872	273,353	1,561	27,714	247,200	74,992
Michigan Central	1,817[21]	7,260,430	3,298,004	11,725,046	1,452,799	1,616,921	252,079	4,281,965	185,205	7,788,969	3,936,077	15,661	464,000	3,487,738	—231,365
Minneapolis & St. Louis	1,586	2,536,644	725,068	3,449,587	432,950	439,638	70,339	1,274,074	83,148	2,299,949	1,149,638	—71	120,533	1,029,034	325,971
Missouri, Kansas & Texas System	3,398	7,509,052	3,226,694	11,359,571	1,609,279	1,451,417	240,509	3,748,725	306,316	7,356,246	4,003,325	—18,849	338,850	3,645,626	1,213,507
Missouri Pacific	3,920[22]	7,645,192	1,926,680	10,373,835	1,668,568	1,800,831	236,349	4,003,852	276,560	7,986,160	2,387,675	—10,424	373,560	2,003,691	1,418,637
Morgan's La. & Tex. R. R. & S. S. Co.	404	1,031,192	365,440	1,481,758	286,588	257,596	51,064	601,334	43,199	1,239,781	241,977	—8,660	73,186	160,131	—116,239
Nashville, Chattanooga & St. Louis	1,231[23]	2,976,152	1,124,658	4,391,820	662,945	810,245	154,898	1,618,628	109,505	3,356,221	1,035,599	—3,117	101,644	930,818	32,044
Nevada Northern	165	443,768	65,070	524,370	67,096	58,852	1,541	108,002	13,793	249,284	275,086	.....	24,785	250,301	13,031
New Orleans Great Northern	283	393,987	126,245	562,599	87,214	66,303	9,617	169,152	27,092	359,378	203,221	—268	7,300	195,653	2,342
New Orleans, Mobile & Chicago	547[24]	606,775	127,912	786,104	128,500	81,407	13,369	271,323	29,279	523,878	262,226	—242	16,621	255,363	41,462
New Orleans, Texas & Mexico	277[25]	365,630	72,939	483,001	100,811	47,273	12,612	214,377	22,829	397,902	85,099	.....	3,877	81,222	35,023
New York Central & Hudson River	3,595[26]	22,773,932	12,840,235	39,615,451	5,525,858	7,273,636	775,451	13,218,097	888,698	27,681,740	11,933,711	141,995	2,118,456	9,957,250	—537,032
New York, Ontario & Western	566	2,547,917	891,301	3,625,976	471,554	501,680	48,897	1,193,085	66,646	2,281,862	1,344,114	—1,576	72,666	1,269,872	250,507
New York, Susquehanna & Western	154[27]	647,614	211,226	956,652	141,016	126,822	7,530	395,430	17,560	688,358	268,294	1,432	67,618	202,108	—161,882
Norfolk & Western	2,018[28]	12,774,311	1,780,663	15,021,923	2,091,593	2,707,038	220,986	4,198,966	267,692	9,486,275	5,535,648	—13,450	480,000	5,042,198	436,519
Norfolk Southern	562	665,873	294,873	1,057,571	123,232	146,119	20,379	326,377	56,082	672,189	385,382	—7,018	30,039	348,325	20,650

Mileage operated in previous period—[1] 4,434; [2] 2,225; [3] 2,242; [4] 2,059; [5] 246; [6] 2,010; [7] 852; [8] 2,556; [9] 263; [10] 328; [11] 842; [12] 1,995; [13] 583; [14] 7,345; [15] 1,603; [16] 353; [17] 109; [18] 176; [19] 1,776; [20] 1,431; [21] 1,805; [22] 3,916; [23] 1,255; [24] 404; [25] 264; [26] 3,591; [27] 152; [28] 2,004. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

FOUR MONTHS OF FISCAL YEAR, 1913—CONTINUED.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General.	Total.					
Northwestern Pacific	401[29]	$586,681	$829,614	$1,506,073	$186,956	$150,112	$15,116	$474,792	$52,235	$879,211	$626,862	$50,316	$576,546	$41,849
Oregon Short Line	1,762[30]	5,821,938	1,933,360	8,188,456	776,912	794,290	114,280	1,874,249	164,878	3,724,609	4,463,847	480,381	3,994,545	455,312
Pecos & Northern Texas	479[31]	650,015	184,959	875,623	104,572	167,535	14,292	261,852	24,976	573,227	302,396	.....	19,336	283,060	111,359
Peoria & Eastern	352	923,479	263,630	1,263,889	170,152	205,595	18,078	431,796	22,779	848,400	415,489	—1,000	39,200	376,289	104,072
Pittsburgh & Lake Erie	221[32]	6,025,834	619,154	6,892,248	638,417	996,367	60,929	1,389,182	98,854	3,183,749	3,709,499	124,000	3,583,499	743,574
Pittsburgh, Shawmut & Northern	279[33]	549,413	41,411	601,973	83,045	131,656	4,888	180,164	15,469	415,222	186,751	6,362	180,389	37,552
St. Joseph & Grand Island	319	412,794	157,220	620,597	116,688	76,791	19,627	254,417	21,102	486,625	133,972	25,584	108,346	—39,263
St. Louis & San Francisco	9,953[34]	9,953,731	3,936,932	14,889,662	1,924,816	1,976,860	312,234	5,102,842	411,340	9,728,082	5,161,576	682,903	4,478,667	289,783
St. Louis, Iron Mountain & Southern	4,742[34]	8,507,437	2,221,985	11,594,783	2,162,287	1,807,536	210,203	3,577,585	280,224	8,037,835	3,556,948	363,180	3,174,528	686,520
St. Louis Merchants' Bridge Terminal	3,318[35]	436,119	79,763	535,551	38,905	100,725	8,848	153,344	14,406	316,228	219,323	8,576	210,747	140,128
St. Louis, San Francisco & Texas	9	.....	1,469	714,114	115,209	23,755	2,672	338,072	25,818	505,526	208,588	24,400	184,188	91,785
St. Louis Southwestern	244	362,866	131,513	523,449	100,719	65,894	10,398	203,188	20,771	400,970	122,479	5,229	117,250	59,275
St. Louis Southwestern of Texas	319	412,794	157,220	620,597	116,688	76,791	19,627	254,417	21,102	486,625	133,972	25,584	108,346	—39,263
San Pedro, Los Angeles & Salt Lake	1,135[37]	2,076,980	1,081,334	3,398,391	346,555	547,484	121,797	1,037,453	75,826	2,129,115	1,269,276	127,299	1,134,853	764,737
Southern Kansas of Texas	125	436,119	79,763	535,551	38,905	100,725	8,848	153,344	14,406	316,228	219,323	8,576	210,747	140,128
Southern Pacific Co.	6,313[38]	21,194,907	11,361,176	34,783,912	3,149,169	4,311,131	693,593	8,856,838	832,937	17,843,668	16,940,244	515,580	1,427,805	16,028,019	2,242,651
Terminal R. R. Ass'n of St. Louis	34[39]	.....	1,132	1,025,425	151,786	58,275	3,629	356,731	29,715	600,136	425,289	50,661	116,600	359,350	101,940
Texas & New Orleans	458	917,615	383,098	1,383,297	212,868	323,530	29,599	532,383	46,234	1,144,614	238,683	—7,396	52,638	178,649	—59,423
Texas & Pacific	1,885	4,061,465	1,594,487	6,106,317	923,222	1,026,808	131,344	2,699,596	182,071	4,963,041	1,143,276	—10,798	192,687	939,791	—622,333
Toledo & Ohio Central	443	1,629,876	250,369	1,998,443	312,456	343,866	27,494	635,332	34,775	1,353,923	644,520	—2,482	81,235	560,803	—58,442
Toledo, Peoria & Western	248	283,100	181,789	493,455	75,850	96,255	9,881	166,198	14,015	362,199	131,256	.....	19,200	112,056	33,131
Toledo, St. Louis & Western	451	1,136,850	139,590	1,362,756	233,841	204,392	38,326	451,691	36,992	965,242	397,514	.....	59,200	338,314	—9,711
Trinity & Brazos Valley	463	703,489	216,572	955,246	134,440	118,837	40,438	389,806	44,343	747,864	207,382	.....	16,775	190,607	—35,301
Union Pacific	3,575[40]	13,746,904	4,081,247	19,387,341	1,859,044	2,000,472	340,322	4,664,967	419,593	9,284,598	10,102,743	5,955	717,578	9,391,120	926,001
Virginia & Southwestern	240	516,903	64,471	598,400	91,421	139,574	7,554	164,451	13,209	416,209	182,191	.....	20,600	161,591	—48,839
Virginian	475	1,606,294	109,972	1,764,229	237,989	336,202	22,398	419,972	34,960	1,051,521	712,708	26,314	70,500	668,522	46,559
Wabash	2,515	7,706,302	2,770,686	11,464,839	1,465,981	1,987,927	344,798	4,187,191	254,424	8,150,321	3,314,518	—13,855	286,120	3,014,543	315,412
Washington Southern	36	147,958	146,569	395,829	52,519	45,249	4,680	151,654	10,916	265,018	130,811	.....	12,691	118,120	7,687
West Jersey & Seashore	356[41]	705,218	2,060,608	2,941,340	364,180	386,396	63,861	953,484	49,921	1,817,842	1,123,498	—16,366	101,466	1,005,666	194,873
Western Pacific	937	1,683,108	537,618	2,290,091	328,447	180,727	117,252	797,078	101,578	1,525,082	765,009	—254	79,703	685,052	216,316
Western Ry. of Alabama	133	229,386	187,369	451,793	78,116	86,287	22,159	128,100	21,692	336,354	115,439	137	18,561	97,015	—24,680
Wheeling & Lake Erie	459[42]	2,625,806	266,988	3,046,831	375,621	519,220	62,104	1,358,757	879,500	55,721	1,863,958	1,182,873	12,153	122,624	1,072,402
Yazoo & Mississippi Valley	1,374	2,249,036	866,769	3,371,918	728,700	503,425	62,104	1,358,757	109,104	2,762,090	609,828	—269	148,000	461,559	—55,020

Mileage operated in previous period—[29] 404; [30] 1,667; [31] 296; [32] 215; [33] 240; [34] 4,732; [35] 3,314; [36] 811; [37] 1,113; [38] 6,183; [39] 35; [40] 3,506; [41] 355; [42] 457. —Indicates Deficits, Losses and Decreases.

Reparation Awarded.

Coffins Box & Lumber Company v. Chicago & North Western, et al. Opinion by the commission:

The commission found that the rate of 42 cents per 100 lbs. for the transportation of wooden beer-bottle carriers in carloads from Minneapolis, Minn., to Des Moines, Iowa, was unreasonable to the extent that it exceeded 18½ cents per 100 lbs. (25 I. C. C., 249.)

Cahill Iron Works v. Nashville, Chattanooga & St. Louis, et al. Opinion by the commission:

The commission found that the rate of $2.20 per 100 lbs. for the transportation of cast-iron, porcelain-lined, combination sink-and-laundry tubs, from Chattanooga, Tenn., to San Francisco, Cal., when shipped in mixed carloads with sinks, was unreasonable to the extent that it exceeds $1.40 per 100 lbs. and prescribed that rate for the future. (25 I. C. C., 252.)

Complaint Dismissed.

Crombie & Company, et al. v. Southern Pacific, et al. Opinion by the commission:

The commission upon reconsideration of all the evidence reaffirmed its former decision in this case, 19 I. C. C., 561. The complaint was that the rate of $2 per 100 lbs. for the transportation of chili pepper in less than carload lots from Los Angeles, Trustin and Anaheim, Cal., to El Paso, Tex., was unjust and unreasonable. (25 I. C. C., 233.)

Arkansas Fertilizer Company v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission:

The commission found that since the shipment on which reparation is claimed was delivered more than three years prior to the filing of the claim with the commission, it is barred from consideration by the provision in the statute that claims for damages must be filed within two years from the date the cause of action accrues, and not after.

Class Rates Reduced.

Baker Commercial Club v. Oregon-Washington Railroad & Navigation Company et al. Opinion by Commissioner Lane:

The commission found that the class rates from Baker City, Oregon, to points on the Oregon Short Line between Olds Ferry, Idaho, and Vale, Oregon, were unreasonable, and prescribed joint class rates for the future. (25 I. C. C., 281.)

Class Rates to Lebanon, Ky., Reduced.

Lebanon Commercial Club v. Louisville & Nashville et al. Opinion by Commissioner Lane:

The commission found that the class rates from Louisville, Ky., to Lebanon, Ky., which are applied as portions of through rates on interstate traffic were unreasonable and prescribed lower rates for the future. That portion of the Fourth Section application of the Louisville & Nashville et al,, which seeks authority to continue lower class rates to Junction City, Ky., from Louisville, Ky., on interstate traffic, than are in effect on like traffic to Lebanon, Ky., an intermediate point, was denied. (25 I. C. C., 277.)

Fruit and Vegetable Rates Reduced.

City of Crawford v. Chicago & North Western et al. Opinion by Commissioner McChord:

Present rates on fruits and vegetables from Louisiana and Texas points, on apples and other deciduous fruits from Oregon, Utah and Idaho, and on citrus and deciduous fruits, canned goods, and vegetables from California points, to Crawford, Neb., were found to be unreasonable and reasonable rates were prescribed. (25 I. C. C., 259.)

Rates on Horses Reduced.

United States v. Southern Pacific. Opinion by the commission:

The commission found that the rates charged for the movement of horses and mules in carloads from Huachuca, Ariz., to Los Angeles and Atascadero, Cal., were unreasonable to the extent that they exceeded $125 and $160 per car, respectively. Reparation was awarded.

The charges for the movement of horses and mules in carloads from Huachuca, Ariz., to San Francisco, Cal., under a special contract entered into on behalf of the government and the carrier, were not found to have been unreasonable. (25 I. C. C., 255.)

Lumber Rates Not Changed.

Appalachia Lumber Company et al. v. Louisville & Nashville et al. Opinion by Chairman Prouty:

The complainants allege that defendants' lumber rates from points on the Cumberland Valley division of the Louisville & Nashville to certain points in Ohio, Michigan and Pennsylvania are unreasonable, because the through rates equal the sum of the intermediate rates based on Cincinnati. The commission found that the mere fact that these through rates are constructed upon the Ohio river does not show them to be unreasonable, and that complainants' contention is therefore not sustained.

The claim that the defendants make lower lumber rates from points on the Cumberland Valley division to more distant points than to intermediate points north of the Ohio river is not passed on, pending fourth-section applications of interested carriers for relief from the operation of the long-and-short haul clause.

No reparation can be awarded up to the time when the commission passes upon these fourth-section applications, unless, possibly, a case is made out under the third section, which might carry with it an award of damages, or unless under the first section the rate to the intermediate points has been found unreasonable. (25 I. C. C., 193.)

Ratings of Coal Mines.

In re investigation of alleged irregularities in the mine ratings among the coal mines served by the Illinois Central. Opinion by Commissioner Clark:

In a controversy over the rating of coal mines by the Illinois Central as a basis for car distribution in periods of car shortage, the respondent and the operators of the mines local to the Illinois Central contended that the ratings should be based solely upon shipments previously made via the Illinois Central. Operators of junction-point mines that are served by respondent and also by one or more other carriers contended that they should be rated by each road serving them, just as if they were local to each road. Respondent and a minority of the local operators contended for ratings based upon the shipping experiences of a substantial preceding period. The junction-point operators and a majority of the local operators insisted upon ratings based upon the hourly capacities of the several mines. The commission found that the ratings of the mines shall be based upon their several hourly capacities for production; that the mines that have outlet by river shall be treated as junction-point mines; that upon days for which the junction-point mine orders no cars from another carrier it shall have its full rating on the Illinois Central; that upon a day for which it orders cars from one other carrier its rating on the Illinois Central for that day shall be 75 per cent. of its full rating; and that upon a day for which it orders cars from two other carriers its rating on the Illinois Central for that day shall be 50 per cent. of its full rating. (25 I. C. C., 286.)

Express Rates Cases.

In re express rates, practices, accounts and revenues.

The commission has issued an order requiring the defendant express companies to file with the commission on or before February 1, 1913, complete detailed statements of the business carried on during one or more days both in interstate and intrastate traffic. The defendants must also show what the earnings would have been had the rates which are now proposed been in effect during the period covered by the report. The subheads on the blank which is to be filled out are as follows: Number of shipments, number of pieces, weight in pounds, total charges assessed, average charge per shipment assessed, average charge per piece, average charge per pound, charges that would have accrued under proposed rates, average per shipment under proposed rates, average per piece under proposed rates, and average per pound under proposed rates. The defendants will also be required on or before February 1, 1913, to show cause why the rates now in effect shall not be declared to be unjust, unreasonable and discriminatory, and why the proposed rates should not be prescribed for the future.

STATE COMMISSIONS.

The Arizona corporation commission has issued an order suspending the operation of the state 3-cent fare law. State and county officers have been enjoined by the federal court from enforcing the law, pending a hearing on January 21.

The Ohio public utilities commission, in its annual report, recommends that all steam railways whose gross earnings reach $6,000 per mile per annum, should be required to install block signals. The commission also recommends seven amendments to the present laws regulating the railways, one providing for a 2-cent fare for interurban roads, another requiring railways to obtain permission from the commission to abandon a station, and another regulating the size of train crews.

COURT NEWS.

The Supreme Court of Mississippi, in a decision by Justice Cooke, involving the rights of passengers on sleeping cars running over the Alabama & Vicksburg Railroad holds that, where necessary, the law of the state requiring separate cars for whites and blacks must be complied with by running a separate sleeping car for negroes. The passengers whose presence gave rise to the present litigation, were negroes making an interstate journey, but the court says that the state law must be complied with, nevertheless. A woman passenger had secured a verdict in the county court for $15,000 damages, she having sat up all night in a day car, because the conductor would not eject the negroes. The railroad company, on appeal, got the sum reduced from $15,000 to $2,000, but otherwise the court affirms the verdict. The road will now appeal to the Supreme Court of the United States.

In the Federal Court at Chicago, December 17, John Carstensen, vice-president of the New York Central lines, and three railroad companies were indicted by the grand jury, charged with having given rebates to the O'Gara Coal Company amounting at $60,000. The Lake Shore & Michigan Southern, the Cleveland, Cincinnati, Chicago & St. Louis, and the Chicago, Indiana & Southern railways are the three roads which were named. The indictment sets forth that the alleged rebates were granted between August 1, 1909, and January 1, 1910, and that they were carried on the books as advance payments for fuel coal to be used by the Lake Shore. It is charged that the coal never was delivered; that the money never was repaid by the O'Gara Coal Company and that the fuel company was permitted to retain the money and use it in its own business. Indictments previously returned against Thomas O'Gara, head of the coal company, and three railroads, charge that certain payments were made outright as rebates.

Rutland Injunction Dissolved.

The Appellate Division of the Supreme Court of New York has decided against minority stockholders of the Rutland Railroad, headed by Tompkins Delevan, in their suit to prevent the sale of its majority stock by the New York Central to the New York, New Haven & Hartford. Justice Ingraham, who wrote the opinion, said that the suit had apparently been brought to compel the purchaser to pay the same price for the minority stock as it had agreed to pay for the stock which carried control. He rejected the plea of Samuel Untermyer, who represented the holders of the 1,340 shares of minority stock, that the transfer should be enjoined because it violated the anti-trust law. Justices Scott and Dowling concurred with the Presiding Justice and Justices Laughlin and Miller dissented.

It is held that the New Haven and Rutland roads are not competitors. Justice Ingraham said:

"It is certainly not clearly established that as the roads exist at present there can be any substantial competition between them. The mere fact that passengers could by a devious and extended route, which would not be practicable as a transportation proposition, pass over the lines of the New Haven system from one point to another, which are also on the Rutland road, does not establish that they are competing roads.

"The New York Central and the system which it controls are

much greater competitors of the Rutland than the New Haven can ever become, and certainly if it would be illegal for the New Haven road to acquire a majority of the stock of the Rutland it would be equally illegal for the New York Central to hold a majority of the stock; and its continuous ownership of that stock, which involves the control of the Rutland, is a more serious violation of the laws of the United States than the control of the Rutland by the New Haven would be. . . . The minority stockholders had failed to show that any consequences of the change of control falling upon them would not fall upon the majority shareholders." The court suggested that a suit in the Federal courts was the proper way to establish a contention that the proposed sale was in violation of the Sherman law.

In the dissenting opinion Justice Laughlin contended that it was at least doubtful whether the New Haven Company would pay nearly three times the market value of the stock for the purpose of controlling the Rutland road unless it could obtain some advantage at that road's expense.

The New York Central in 1905 obtained control of the Rutland by acquiring a large block of stock from the late Dr. W. Seward Webb. According to the claims of the minority stockholders the Central "milked" the Rutland and systematically withheld dividends from the stockholders. A suit for malfeasance is now pending, in which it is alleged that more than a million dollars was improperly withheld from the stockholders by the directors and officers of the road, and a second suit is pending in which it is charged that more than a million dollars was taken from the stockholders' property by diversion of freight to the New York Central and allied roads.

In 1911 half the preferred stock held by the Central was sold to the Boston & Maine.

Union Stock Yards Loses Case.

The Supreme Court of the United States on December 9, in the case against the Union Stock Yard and Transit Company of Chicago, sustained the position of the Interstate Commerce Commission that the commerce carried on at the stock yards is interstate, and affirming the right of the Commission to bring suit to have annulled, as amounting to a rebate, the company's contract to pay $50,000 to Pfaelzer & Sons, packers, for erecting a plant adjacent to its tracks.

The Commission began an action in the Commerce Court to enjoin the Union Stock Yard and Transit Company, the Chicago Junction Railway Company, which operates the U. S. Y. & T. lines, and the Chicago Junction Railways and Union Stock Yard Company, which holds the stock of the other two companies, from engaging in interstate commerce until they had filed tariffs with the Commission.

The Commerce Court held that the Chicago Junction Railway Company alone was engaged in interstate commerce and so required it to file tariffs, but dismissed the action as to the other companies.

Justice Day, in announcing the Supreme Court's opinion, said that the Commerce Court erred in holding that the Union Stock Yard and Transit Company had exempted itself from the operation of the federal law by leasing its property to the railway company.

Instead of sending the case back to the Commerce Court for further hearings the Supreme Court directed the lower court to enter a decree enjoining the carrying out of the Pfaelzer contract.

The Union Stock Yards tracks aggregate a length of 300 miles. The Stock Yards Company, in 1897, leased all its tracks and equipment to the railroad company which now operates them; but the owning company still receives two-thirds of the profits. The Chicago Junction Railways and Union Stock Yards Company of New Jersey own 90 per cent. of the stock of both companies; and the New Jersey Company guarantees contracts of the subordinate companies. The court holds that the sheds and pens of the stock yards are, in effect, a railroad depot; and this joint operation, the division of profits and the common ownership by a holding company are held by the court to be sufficient to warrant treating all the companies substantially the same as a railroad, within the terms of the act to regulate commerce and the commerce is interstate. Paying the packers a bonus for putting up their plant was a discrimination against other packers to whom no bonus was paid.

Railway Officers.

Executive, Financial and Legal Officers.

D. I. Roberts, of Montreal, general manager of the Napierville Junction Railway, and general manager and general freight and passenger agent of the Quebec, Montreal & Southern, has been elected president of the United States Express Company, with headquarters at New York, which office has been vacant since the death of the late Thomas C. Platt. Mr. Roberts is 59 years old. He is well known to American railway men, having been in the service of the Pennsylvania Lines and the Erie from 1873 to 1901. For the ten years from 1891 to 1901 he was general passenger agent of the Erie.

J. M. Johnson, vice-president in charge of traffic of the Missouri Pacific and St. Louis, Iron Mountain & Southern, has been appointed general director of traffic of those lines and the Denver & Rio Grande, the Western Pacific and the International & Great Northern, with headquarters at St. Louis, Mo. M. C. Markham, assistant to the president of the Missouri Pacific and St. Louis, Iron Mountain & Southern, has been appointed assistant general director of traffic, with office at St. Louis, and E. B. Boyd, assistant to the vice-president, has been appointed assistant general director of traffic, with headquarters at Chicago.

W. R. Shelby, who has been vice-president and treasurer of the Grand Rapids & Indiana since 1877, will on December 23 be retired under the pension rules of the Pennsylvania system, having reached the age of 70 years. Mr. Shelby began railway work in 1869 as secretary and treasurer of the Continental Improvement Company, operating the Grand Rapids & Indiana, Cincinnati, Richmond & Ft. Wayne, Michigan, Lake Shore and Traverse City railroads. From 1870 to 1873 he was also secretary and treasurer of the Southern Railway Security Company, operating the East Tennessee, Virginia & Georgia, the Memphis & Charleston and other southern roads, and in 1877 he was elected vice-president and treasurer of the Grand Rapids & Indiana, with headquarters at Grand Rapids, Mich.

John Mitchell Johnson, whose appointment as general director of traffic of the Gould Lines has been announced in these columns, was born May 13, 1845, at Cincinnati, O., and was educated in the common schools. He entered railway service January 1, 1871, as station agent of the Indianapolis, Cincinnati & Lafayette at Franklin, Ind., and in the following year he was made general freight and ticket agent of the Cincinnati & Martinsville. From July, 1875, when that road became a part of the Indianapolis, Cincinnati & Lafayette system, until 1877, he was traveling auditor of the latter road at Cincinnati; subsequently was in charge of local freight traffic of that road; from 1879 to January, 1883, was assistant general freight agent of the Indianapolis, Cincinnati & Lafayette and Cincinnati, Lafayette & Chicago, and afterwards until February, 1884, was assistant general freight agent of the Cincinnati, Indianapolis, St. Louis & Chicago. Mr. Johnson then went to the Chicago, Rock Island & Pacific as first assistant general freight agent. He was advanced to general freight agent on March 1, 1888, eight years later was promoted to freight traffic manager, and in March, 1899, was elected third vice-president of that road. He resigned April 1, 1903, to become assistant to the vice-president of the Gould Lines, and on November 1, 1907, was made vice-president in charge of traffic of the Missouri Pacific and the St. Louis, Iron Mountain & Southern. He will assume the duties

J. M. Johnson.

of general director of traffic of those roads and the Denver & Rio Grande, Western Pacific and International & Great Northern, with headquarters at St. Louis, Mo., on January 1.

Operating Officers.

Frank E. Hatch has been appointed trainmaster of the Illinois Central, with office at Centralia, Ill., in place of George S. Rought, assigned to other duties.

R. B. Mann has been appointed assistant trainmaster of the Cincinnati, Hamilton & Dayton, with headquarters at Lima, Ohio, to succeed W. A. Carruthers.

H. M. Torrence has been appointed assistant superintendent of the Houston & Texas Central, with office at Ennis, Tex., to succeed C. M. Freeman, resigned.

P. G. Walton has been appointed assistant superintendent of the St. Louis, Brownsville & Mexico, with headquarters at Kingsville, Tex., in place of W. W. McCormack.

F. H. Alfred, assistant general manager of the Pere Marquette, at Detroit, Mich., has been appointed general manager, with headquarters at Detroit, succeeding William Cotter, resigned.

W. H. Molchior has been appointed superintendent of the Rocky Mountain division of the Chicago, Milwaukee & Puget Sound, with headquarters at Three Forks, Mont., to succeed J. E. Hood, resigned.

J. A. Droege, who has been appointed superintendent of the Shore Line division of the New York, New Haven & Hartford, with office at New Haven, Conn., as has been announced in these columns, was born at Deer Park, Md., and began railway work in 1880 as a telegraph operator on the Baltimore & Ohio and was then despatcher and later became a stenographer. He was subsequently with the Chesapeake & Ohio, the Norfolk & Western and the Richmond & Danville, now a part of the Southern Railway, consecutively as yardmaster, chief train despatcher and trainmaster. On January 1, 1899, he went to the Lehigh Valley as trainmaster in charge of Jersey City and Perth Amboy terminals, and for three months was trainmaster in charge of the Buffalo terminals. He returned to Jersey City and in November, 1900, was promoted to superintendent of the Pennsylvania & New York division of the same road at Sayre, Pa. In December, 1904, he went to the New York, New Haven & Hartford, and was made superintendent of the Providence division, which position he held at the time of his recent appointment as superintendent of the Shore Line division at New Haven. The notice of Mr. Droege's promotion in the Providence papers, the *Journal*, the *Bulletin* and the *Tribune*, are highly complimentary, indicating that whatever may be the cause of the alleged angry feeling in that city toward the New Haven road, the trouble is not with the local management. The *Journal* says: "The advancement of Mr. Droege to the more responsible position of superintendent of the Shore Line division, is a merited recognition of ability and efficiency. Mr. Droege is classed among the ablest operating men in this part of the country and he has the unusual distinction of never having had a passenger killed on his division since he came to Providence, eight years ago. In his dealings with the public he is considerate and tactful, and his habit of studying both sides of a question before giving decisions has saved the road much criticism."

J. A. Droege.

W. H. O'Keefe, superintendent of the Middle division of the Michigan Central, has been appointed superintendent of terminals at Detroit, Mich., succeeding M. T. Wright, who will take the place of Mr. O'Keefe at Jackson, Mich. H. Shearer, superintendent of the Canadian and Michigan Middle divisions, has been appointed assistant to the general manager, with office at Detroit.

T. A. Sweeney, assistant superintendent of the Chicago Great Western, at Chicago, has been appointed superintendent of the Eastern division, with headquarters at Chicago, succeeding J. A. Gordon, resigned to accept service with another company, and F. Kinsey, inspector of transportation, has been appointed terminal superintendent at Oelwein, Iowa, succeeding F. N. Reynolds.

Marshall E. Johns, superintendent of the New York, Susquehanna & Western and the Wilkes-Barre & Eastern at Jersey City, N. J., having been granted leave of absence, Arthur B. Shafer, trainmaster at Stroudsburg, Pa., has been appointed acting superintendent. Joseph D. Rahaley, chief despatcher, has been appointed trainmaster, with jurisdiction over the W.-B. & E. division, and main line between Beaver Lake, N. J., and Stroudsburg, Pa., inclusive, and John Waldron succeeds Mr. Rahaley.

William Cotter has tendered his resignation as general manager of the Pere Marquette, owing to the illness of his wife, and will go to live at Houston, Tex. Mr. Cotter has been in railway service since 1874, and until 1890 was operator and despatcher on various roads. He was subsequently for six years trainmaster of the Wabash, from 1896 to 1899, superintendent of the Eastern division of the Grand Trunk at Montreal, and from the latter date to July, 1901, superintendent of the Western division of that road at Detroit, Mich. Mr. Cotter then became general superintendent of the St. Louis, Iron Mountain & Southern, and was made manager of the Missouri Pacific System in October, 1902, resigning October 1, 1904, to accept the position of general manager of the Pere Marquette. He was elected president also on December 14, 1907.

Traffic Officers.

T. D. Mullaly has been appointed a freight soliciting agent of the Southern, with office at Tampa, Fla., succeeding R. B. McGroarty, transferred.

O. M. Conley has been appointed general agent of the freight department of the Frisco Lines, with office at Chicago, in place of G. H. Kummer, promoted.

C. H. Mitchell has been appointed commercial agent of the Chicago, Milwaukee & St. Paul, with office at New York, to succeed G. E. Chase, assigned to other duties.

F. N. North, contracting agent of the Wabash at Indianapolis, Ind., has been appointed traveling freight agent, with headquarters at Pittsburgh, Pa., succeeding D. E. Gilbert, promoted.

C. H. Easum has been appointed traveling freight agent of the Illinois Central, with office at Brookhaven, Miss., in place of J. L. Morgan, assigned to other duties. C. R. Calvert succeeds Mr. Easum as traveling freight agent at Memphis, Tenn.

T. J. McGeoy, assistant general western freight agent of the Delaware, Lackawanna & Western, at Chicago, has been appointed general western freight agent, with headquarters at Chicago, succeeding W. N. Babcock, deceased, and his former position has been abolished.

William Humphreys, commercial agent of the Southern at Dallas, Tex., has been appointed commercial agent, with office at Evansville, Ind., succeeding E. D. Stratton, resigned to go to another company, and J. B. Flynn has been appointed traveling freight agent, with office at Detroit, Mich.

John D. Mahon, contracting freight agent of the Chicago, St. Paul, Minneapolis & Omaha, at Duluth, Minn., has been appointed general agent, with headquarters at Superior, Wis., in place of Truman H. Clark, who has been appointed commercial agent, with office at Minneapolis, Minn.

I. M. Griffin, assistant general freight agent of the Texas & Pacific, has been appointed general freight agent, with headquarters at Dallas, Tex., succeeding E. L. Sargent, resigned on account of ill health; H. L. Redfield has been appointed first assistant general freight agent and chief of tariff bureau at Dallas; J. B. Payne, heretofore chief clerk to traffic manager, has been

appointed assistant general freight agent of the Louisiana lines, with headquarters at New Orleans; and J. S. Houston has been appointed assistant general freight agent in charge of all outside agencies, with headquarters at St. Louis, Mo.

Wilmer J. Wagner, whose appointment as assistant general freight agent of the Chicago, Burlington & Quincy, has been announced in these columns, was born May 26, 1866, at Constantine, Mich. He received a high school education and began railway work December 1, 1883, with the Chicago, Burlington & Quincy, with which road he has been continuously for 29 years. From 1891 to 1901 he was successively Western Union messenger, baggage master, telegraph operator and station agent at many places on the Creston division. He then was made freight agent at Burlington, Ia., and from 1904 to Dec. 1, 1907, was commercial agent at Des Moines, Ia. Mr. Wagner was appointed division freight agent at Burlington on the latter date, from which position he was on Dec. 1 promoted to assistant general freight agent of the Illinois & Iowa district of the lines east, with headquarters at Chicago.

W. L. Nichol, who has been appointed assistant general freight agent of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., has been in the service of that road for over 21 years. He began railway work as a clerk in the local agent's office of the N. C. & St. L. at Atlanta, Ga., and was later transferred to the general offices at Nashville, Tenn. He was then for a short time in the claim department. His next position was in the freight traffic department under the late George R. Knox, general freight agent. During the Tennessee centennial, in 1897, Mr. Nichol was assistant agent at the exposition in charge of the terminals. He was subsequently made commercial agent at Chicago, and in 1902, returned to Nashville as commercial agent, which position he held at the time of his recent appointment as assistant general freight agent of the same road, as above noted.

W. L. Nichol.

Henry Goban Waring, whose appointment as assistant general freight agent of the Seaboard Air Line, with headquarters at Norfolk, Va., has been announced in these columns, was born on May 27, 1873, in King and Queen county, Va., and was educated in the common schools. He began railway work on September 1, 1891, with the Georgia Pacific, and was chief clerk when that company was taken over by the Southern Railway in September, 1894, when he became quotation clerk in the division freight agent's office at Atlanta, Ga. From November, 1895, to September, 1897, he was with the South Eastern Freight Association at Atlanta, and then was out of railway work until May 1898, when he went in the auditor's office of the Atlanta, Knoxville & Northern, now a part of the Louisville & Nashville. He was appointed quotation clerk in the office of the assistant general freight agent of the Southern Railway in October, 1899. From September, 1900, to March, 1903, he was rate clerk in the general freight office of the same road, and then became chief clerk to the division freight agent of the Seaboard Air Line at Cedarstown, Ga. In July, 1904, he went to the Central of Georgia as rate clerk, and from the following December, to December, 1908, he was first rate clerk and then chief rate clerk in the general freight office of the Southern Railway. He was appointed chief clerk to traffic manager of the Carolina, Clinchfield & Ohio on December 5, 1908, and in November, 1910, was promoted to assistant general freight agent of the same road, which position he held until November 1, 1912, when he became assistant general freight agent of the Seaboard Air Line, as above noted.

Engineering and Rolling Stock Officers.

A. S. Going has been appointed engineer of construction of the Grand Trunk, with office at Montreal, Que.

S. Baldwin has been appointed resident engineer of the Trinity & Brazos Valley, with office at Teague, Tex., in place of F. A. Pollak.

John L. Smith, acting master mechanic of the Pittsburgh, Shawmut & Northern, at St. Marys, Pa., has been appointed master mechanic, effective January 1.

W. E. Ladley, master mechanic of the Chicago & Alton, with headquarters at Bloomington, Ill., has been appointed superintendent of motive power of the Reid Newfoundland Company, with headquarters at St. Johns, Newfoundland, effective January 1. He will have charge of locomotive, marine building and repairs, traveling engineers, engineers, firemen and all mechanical matters.

William C. Sealy, whose appointment as assistant master mechanic of the Grand Trunk, with headquarters at Toronto, Ont., has been announced in these columns, was born on November 29, 1886, at Stratford, Ont., and was educated in the public schools of his native town and at Collegiate Institute. He began railway work in September, 1902, on the Grand Trunk, and until 1907 was an apprentice. He was then for one year chargeman, and from 1908 to 1909 was erecting shop foreman. He was promoted to general foreman of the Toronto shops in 1910, which position he held at the time of his recent appointment as assistant master mechanic, as above noted.

Robert Clemons Falconer, whose appointment as principal assistant engineer of the Erie, with headquarters at New York, has been announced in these columns, was born on March 21, 1874, at St. Mary's, Pa., and graduated from the University of Wisconsin in 1895 with the degree of C. E. He began railway work on the Pennsylvania Lines West of Pittsburgh in December, 1898, and until May, 1901, was transitman and resident engineer. From May, 1901, to October, 1905, he was out of railway work. In October, 1905, he was appointed assistant engineer in the construction department of the Erie, and from October, 1911, until his recent appointment was division engineer of the New York division of the same road.

O. T. Waring, superintendent of the Atlantic Coast Line at Florence, S. C., has been appointed engineer of roadway with office at Savannah, Ga., succeeding T. S. Tutwiler, assigned to special duties. Mr. Waring graduated as a civil engineer from the University of Pennsylvania in 1902, and in July of the same year began railway work in the engineering department of the Baltimore & Ohio. He was promoted to assistant division engineer the following July, and in August, 1905, went to the Atlantic Coast Line as assistant engineer, leaving that company in November, 1906, to go to the Charleston & Western Carolina in the same capacity. He was promoted to assistant superintendent of that road in November, 1907, and the following year returned to the service of the Atlantic Coast Line as roadmaster. From September, 1909, to October, 1910, he was acting engineer of roadway and was then appointed assistant engineer. He remained in that position until January, 1911, when he was made superintendent of the new Winston-Salem district of the Atlantic Coast Line.

OBITUARY.

C. C. Campbell, assistant general freight agent of the Chicago, Indiana & Southern, died at Chicago on December 15.

George B. Voorhees, traveling freight agent of the St. Louis Southwestern, with headquarters at Little Rock, Ark., died on December 10, aged 50 years.

William Johnson Barclay, general manager of the Canadian Northern Quebec, the Quebec & Lake St. John, the Halifax & Southwestern and the Inverness Railway & Coal Company, with headquarters at Montreal, Quebec, died on December 13, at Riverside, Cal., at the age of 61.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE DELAWARE & HUDSON is in the market for 12 consolidation locomotives.

THE LAKE SHORE & MICHIGAN SOUTHERN is figuring on a number of locomotives.

THE ST. LOUIS & SAN FRANCISCO has been figuring on some ten-wheel locomotives, but has not yet decided definitely to purchase.

THE BOSTON & MAINE has ordered 20 Pacific type locomotives, 20 consolidation locomotives, and 10 switching locomotives from the American Locomotive Company.

THE BIRMINGHAM SOUTHERN has ordered 2 consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 22 in. x 28 in.; the diameter of the driving wheels will be 53 in., and the total weight in working order will be 200,000 lbs.

THE TORONTO, HAMILTON & BUFFALO has ordered 3 six-wheel switching locomotives and 1 Pacific type locomotive from the Montreal Locomotive Works. Two of the switching locomtives will be equipped with superheaters, will have 20 in. x 26 in. cylinders, 51 in. driving wheels, and in working order will weigh 133,000 lbs. The other switching locomotive will be equipped with a superheater, will have 21 in. x 28 in. cylinders, 51 in. driving wheels, and in working order will weigh 164,000 lbs. The Pacific type locomotive will be equipped with a superheater will have 23 in. x 28 in. cylinders, 69 in. driving wheels, and in working order will weigh 219,000 lbs.

CAR BUILDING.

THE MONTPELIER & WELLS RIVER is figuring on 7 refrigerator cars.

THE GRAND RAPIDS & INDIANA is in the market for 20 caboose cars.

THE ERIE has ordered 55 steel underframe coaches from the Standard Steel Car Company.

THE MISSOURI, KANSAS & TEXAS has ordered 2,000 thirty-ton box cars from the American Car & Foundry Company.

THE NORFOLK & WESTERN has ordered 500 box cars from the Mt. Vernon Car & Manufacturing Company, and 500 stock cars from the Ralston Steel Car Company.

THE CHICAGO, BURLINGTON & QUINCY is said to have ordered 2,000 additional freight cars from the Haskell & Barker Car Company. This item has not been confirmed.

THE CANADIAN NORTHERN is said to have ordered 100 refrigerator cars from the Mt. Vernon Car & Manufacturing Company. This item has not been confirmed.

THE AMERICAN REFRIGERATOR TRANSIT is said to have ordered 2,000 refrigerator cars from the American Car & Foundry Company. This item has not been confirmed.

THE ILLINOIS CENTRAL has ordered 2,500 all-steel gondola cars and 500 flat cars from the Bettendorf Axle Company, and is in the market for 1,000 additional gondolas, 500 stock cars, 500 refrigerator cars, 800 furniture cars, 500 fruit cars and 70 cabooses.

SIGNALING.

The General Railway Signal Company publishes a statement to the effect that on the Rochester division of the New York Central, where the signal company's selector is used on the despatcher's telephone line for calling, the cost of the service is 4.6 cents a day, the average number of calls in that time being 565. The statement shows 112,920 calls in 200 days; five failures of all kinds; one failure chargeable to selector. Average length of call four seconds. Cost per 1,000 calls, $.082; per year, $16.79.

The Buffalo, Rochester & Pittsburgh plans during the coming year to install automatic block signals on 51 miles of its line; Gainesville to Ashford, 38 miles, Ashford to East Salamanaca, 13 miles.

The Chicago Great Western plans during the coming year to put in an all electric interlocking at Somers, Ia., the intersection of the Chicago, Rock Island & Pacific; the machine will have 26 working levers and two spare spaces. A mechanical interlocking, Saxby & Farmer improved, is to be put in at Oelwein, the crossing of the Rock Island.

New automatic block signals to be installed on the Great Northern during the coming year include the equipment of the new track between Metum and the Great Northern Docks at Seattle, six miles, and also on the line which is to be double-tracked between Congo and Wawina on the Lake district. New mechanical interlockings are to be installed at drawbridges at Snowden, Mont., and Fairview, N. D.; at Bowbells, N. D., and at Seattle, Wash., for Salmon Bay drawbridge.

The Indiana State Railroad Commission has ordered the following installations of automatic block signals, the work to be done next year: Baltimore & Ohio, McCool to LaPaz Junction, 50 miles. Baltimore & Ohio Southwestern, North Vernon to the Ohio state line, 34 miles. Cincinnati, Hamilton & Dayton, Indianapolis, eastward, 48 miles to a connection with the signaling now being installed, the two orders completing the signaling of the road from Indianapolis to the Ohio state line. Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, westward, 46 miles. This installation with the signals now being installed will complete the signaling from Indianapolis to the Wabash river near Terre Haute.

The Boston & Albany is to install an all-electric interlocking of 80 levers and a mechanical plant of 60 levers at Worcester. Both of these are to be equipped with approach locking and route locking, with trailing release. The signals are of the upper quadrant type. The top and the middle arm of the home signals at the mechanical interlocking are to be worked with 10 volt motors. All the electrical energy required for the operation of both interlockings will be normally taken from a storage battery. On the Newton Highlands Branch, 10 miles, double-track, the clock work signals (exposed disk) are to be replaced by normal danger three-position, upper quadrant semaphore signals operated by storage battery and lighted by electricity.

The Southern Pacific plans to install automatic block signals on 248 miles of the Pacific system during the coming year; single track, 231 miles, double track, 17 miles. In addition to this, other single track lines, aggregating about 115 miles, now equipped with automatic block signals will be double-tracked during the year and the signals will be rearranged accordingly. The plans for the year 1913 provide for seven important new power interlockings as follows: General Railway Signal Company's electric interlocking at Alameda Mole, 48 levers; Eighth street, Alameda, 12 levers; Gilman street, Berkeley, 16 levers, and Masonic avenue, Berkeley, 32 levers. Union electro pneumatic interlocking at two places in Oakland, 59 levers and 39 levers, and at San Pedro, Cal., 15 levers.

The Illinois Central, reporting to this office its mileage of road block-signaled, gives memoranda concerning 216 miles of automatic signals now under construction, the principal sections being as follows: Mattoon to Effingham; Mason to Branch Junction, and Branch Junction to Carbondale, double track; Belleville to Carbondale (nearly all single track); and Clark street, Chicago, to Hawthorne. In this last named section, 11 miles, double track, alternating current track circuits will be installed. The plans of the company for the ensuing year include one new power and four mechanical interlocking plants, as follows: Manchac drawbridge, electric interlocking, 16 levers; mechanical interlockings at Brookhaven, 26 levers; Mason City, 15 levers, and Waterloo 15 levers. The fourth mechanical interlocking is at Olney, Ill., 26 levers, the contract for which has been let by the Baltimore & Ohio Southwestern to the Federal Signal Company.

Supply Trade News.

The offices of Clement F. Street, Schenectady, N. Y., have been moved to 30 Church street, New York.

The Oxweld Acetylene Company removed its general office in Chicago on December 16, from the Peoples Gas building, to its new works at Thirty-sixth street and Jasper place.

A. B. Chadwick, superintendent of the Armour car shops, Meridian, Miss., has resigned to become manager of the shops of the Grip Nut Company, Chicago, effective January 1.

The D. S. Hunter Company, Minneapolis, Minn., has been made the representative of Hubbard & Company, Pittsburgh, Pa., manufacturers of railroad track tools, etc., in Minneapolis and St. Paul.

John J. Swan, formerly manager of the New York office of the Chicago Pneumatic Tool Company, and later mechanical engineer in the compressor department of that company, has resigned to go to the Oil Power Enginering Corporation, New York.

A. E. Crone, formerly storekeeper of the New York Central & Hudson River, at Depew, N. Y., has been made supply agent of the Buffalo Brake Beam Company, Buffalo, N. Y., with office in that city.

The Western Electric Company, Chicago, has declared an extra dividend of $2 on its common stock in addition to the regular quarterly dividend of $2 per share, payable December 31 to stock of record December 24.

Fred Coe Taylor, chief engineer of the Conley Frog & Switch Company, Memphis, Tenn., has resigned to go to the H. W. Johns-Manville Company, New York, as manager of its insulation department, with office in St. Louis, Mo. J. W. Buzick, assistant engineer of the Conley company, succeeds Mr. Taylor.

The Scherzer Rolling Lift Bridge Company, Chicago, will furnish a bridge 118 ft. from center to center of end bearings, as a part of a bridge to cross the Fox river at West Algoma street, Oshkosh, Wis. It will consists of plate girder construction throughout, and will require 700 tons of steel and machinery.

The general offices of the Allegheny Steel Company, Brackenridge, Pa., were almost entirely destroyed by fire on December 15, together with correspondence records, etc. Those who have sent letters to this company recently and have not yet received reply should immediately forward copies of such correspondence to the company.

Henry Hess has sold his stock holdings in the Hess-Bright Manufacturing Company, Philadelphia, Pa., makers of ball bearings, to the Deutsche Waffen & Munitionsfabriken, Berlin, Germany, and has resigned his position to devote himself to his other interests. The controlling ownership of the company remains in America in the hands of F. B. Bright, president.

F. M. Whyte, who in 1910 was general mechanical engineer of the New York Central Lines, with office in New York, has been elected vice-president of the Hutchins Car Roofing Company, with offices in New York. The U. S. Metal & Manufacturing Company is the eastern representative of the company, and the Spencer Otis Company, Chicago, is its western representative.

Charles W. Beaver has been made manager of the chain block department of the Yale & Towne Manufacturing Company, New York, succeding R. P. Hodgkins, resigned. Mr. Beaver has been connected with the chain block department of this company for a number of years, first as salesman and later as assistant manager. For the past two years he has represented the company in Europe.

George Bronson Rea, publisher of the *Far Eastern Review*, 127 Szechuen Road, Shanghai, China, has been appointed secretary of the Chinese National Railway Corporation under Dr. Sun Yat-sen. The plan is to have future Chinese railways financed through this Chinese National Railway Corporation, and it is understood that the scheme proposed by Dr. Sun comprises a number of thousand miles of railway.

The Vandorn & Dutton Company, Cleveland, Ohio, has increased its space and facilities for the manufacture of its Hard Service portable electrically operated drills and reamers by disposing of its electric department in which armature, field and induction motor coils for motors for railway and mill service, were produced. The facilities pertaining to motor repairs, armature, field and induction motor coils have been taken over by the Cleveland Coil & Manufacturing Company.

The Union Switch & Signal Company, Swissvale, Pa., has declared the usual quarterly dividends of 3 per cent. on its common and preferred stocks. In addition the company has declared a dividend of 10 per cent., payable in common stock to holders of both common and preferred. The dividends are all payable January 10, to stockholders or record December 31. About $500,000 common stock was held in the treasury. The stock dividend will be paid out of the treasury stock.

W. J. Warder, Jr., was made works manager of the Crocker-Wheeler Company, Ampere, N. J., on October 1. Mr. Warder immediately recognized the necessity of acquiring a new punch press department and a concrete building 80 ft. x 80 ft. and 15 ft. high, with a monitor roof down the center to accommodate a five-ton crane was planned. Just one month later ten large punch presses, a full equipment of dies and grinders for the dies had been installed and the plant was operating at maximum capacity, punching 20 carloads of sheet metal.

Joseph M. Brown, who has been engaged in the railway supply business under the name Joseph M. Brown Company, has taken a partner and incorporated under the name of Brown-Lewis Railway Supply Company, which will continue the representation of the several companies represented by Mr. Brown, in addition to the high-speed tool steel of the Newman-Andrew Company of New York, importers of the "Toledo brand" of tool steel. This account will be handled by Mr. Brown's partner, James S. Lewis, who has been connected with the Charles G. Stevens Company, and has had many years of experience in tool steel business.

William Miller, president of the Monarch Pneumatic Tool Company, has resigned, effective December 31, and has accepted the vice-presidency of the Pyle-National Electric Headlight Company, with offices in the Karpen building, Chicago. Mr. Miller began his apprenticeship in the Hannibal & St. Joseph shops at Hannibal, Mo., in 1881, and in 1885 was journeyman with the Missouri, Kansas & Texas at Hannibal. He was with the Wabash at Moberly, Mo., in 1886, and the following year was employed by the Denver & Rio Grande at Denver, Colo. He became shop foreman of the St. Louis & San Francisco at Springfield, Mo., in 1889; general foreman of shops of the Colorado Midland at Colorado City, Colo., in 1900; master mechanic of the Terminal Railroad Association of St. Louis in 1904, and was appointed assistant superintendent of motive power of the Denver & Rio Grande in 1905. He went to the Western Maryland as superintendent of motive power and car department at Union Bridge, Md., in 1907, and in 1908 entered the commercial field as vice-president of the Adreon Manufacturing Company, with offices at Chicago. Mr. Miller became president of the Monarch Pneumatic Tool Company and vice-president of the Standard Railway Equipment Company in 1911.

NEW RAILWAYS FOR SUMATRA.—In 1908 the surveys were made for two railway systems to be built by the Dutch Indies government, which together would extend from Telok Betoeng, at the extreme southern end of Sumatra, through the very middle of the island to Medan. These surveys have since been approved, and money allotted by the government to begin the work. Although these railways will actually form one continuous line, they are nominally divided, for construction purposes into two distinct systems, as follows: The South Sumatra Railway, extending from Telok Betoeng to Petanang, with a branch to Palembang, near the east coast; and another branch to Benkoelen, on the southwest coast. This system, with branches, will total 840 miles. It is to be of 3 ft. 6 in. gage, and the estimated cost of construction is $43,200,000, to be extended over a period of 21 years. In other words, about 40 miles will be built, and $2,050,000 expended each year on this system alone. The Middle Sumatra Railway will extend northward from Petanang, the north end of the South Sumatra system, to Medan.

Railway Construction.

ALMA & JONQUIERES.—Application has been made to the Quebec legislature for incorporation to build the following lines: From Herbertville, Que., northwest to Lake St. John, between Grande Discharge and Petite Discharge, 20 miles; from St. Joseph d'Alma, easterly to Jonquieres, 30 miles. Canon & Parent, Quebec, Canada, are solicitors for the applicants.

ARGENTINE CENTRAL.—See Montezuma & Western.

BATESVILLE SOUTHWESTERN.—This company is building with its own forces a section of 2.7 miles from mile post 14 to Crowder, Miss., of the extension projected some time ago to Charleston.

CARY NORTH & SOUTH.—This company is carrying out work with its own forces on the line on which work was started some time ago from Cochran, Ga., to Cary, 10 miles, and is making surveys from Cary to Toomsboro, 29 miles.

CENTRAL VERMONT.—See Montreal & Southern Counties.

DOMINION NORTHWESTERN.—Application has been made in Canada for incorporation to build from Regina, Sask., west to Tuxford on the Canadian Pacific, thence to Red Deer, Alta., with a branch through Battleford, Sask., to Fort McKay. M. J. O'Connor, Ottawa, Ontario, is solicitor for the applicants.

CHICAGO, MILWAUKEE & ST. PAUL.—Contracts for grading on revision and second track work have been let as follows: From Green Island, Iowa, to Browns, to the W. E. Callahan Construction Company, Kansas City, Mo.; Browns to Oxford Junction, to P. T. Walsh, Davenport, Iowa; Oxford Junction to Martelle, to Donald Jeffrey, of Delmar Junction, Iowa; Milan, Minn., to Millbank, to Morris, Shepard & Dougherty, of St. Paul.

FAIRCHILD & NORTHEASTERN.—Work on the extension which was projected some time ago west to Carlisle, Wis., is now under way on a 7-mile section from Strader to Emmet. Peter Nelson & Co., Minneapolis, Minn., have the contract. (April 5, p. 824.)

GEORGIA INTERSTATE.—Incorporated in Georgia with $500,000 capital to build a line in Madison county via Danielsville. The line may eventually be extended southeast to Augusta. The incorporators include L. B. Greene, T. A. Grimes, J. E. Gordon and J. E. Baker, Danielsville, Ga.

GREENSBORO NORTHERN & ATLANTIC.—An officer writes that the counties of Guilford and Alamance, N. C., have voted a subscription of $200,000 in aid of this project, and the prospects are good for starting work soon on the line. Surveys have been made and most of the right of way secured. The plans call for building from Greensboro, N. C., east and south through Burlington and Graham towards Fayetteville. On the northern end the route is through the center of Alamance and Caswell counties, N. C., to Danville, Va., thence to Lynchburg. W. Washbaugh is chief engineer, Charlottesville, Va. (August 9, page 271.)

GULF LINES CONNECTING.—According to press reports, work is now under way by the R. M. Bushman Construction Company on a section of this line north of Golconda. The company was organized early this year to build from a point near Danville, Ill., to the new bridge at Paducah, with a branch east to a point on the Wabash river opposite Mt. Vernon, Ind., and another branch west to Cairo, and Thebes. The incorporators include P. A. Schlafly, E. P. Keshner and H. J. Hornburg, all of East St. Louis. (February 9, page 263.)

HUDSON BAY RAILWAY.—Grading work which has been under way for some time is about finished on the first section of 75 miles from The Pas, Man., northeast. The entire line to Port Nelson, 420 miles, is under contract to J. D. MacArthur, Winnipeg, Man. (August 30, p. 409.)

LOS ANGELES PACIFIC.—See Pacific Electric.

MACOMB & WESTERN ILLINOIS.—This company is making surveys for an extension from Macomb, Ill., northwest to Stronghurst, 25 miles, and from Littleton on the southern end south to Rushville, 10 miles.

MONTEZUMA & WESTERN.—An officer of this company which was organized in 1910, writes that a new survey has been made from Silver Plume, Colo., to Dillon, covering the territory of the old Argentine Central on the east slope of the continental divide into new territory on the west slope. This survey is on a 2.75 per cent. grade, and is 44 miles long. If the present financial arrangements are carried out, the company expects to begin work in the spring of 1913. The Argentine Central was built with a 6 per cent. ruling grade, and was found too steep for freight. Operations will probably be discontinued and the tracks taken up. W. R. Houghton, auditor, Denver, Colo.

MONTREAL & SOUTHERN COUNTIES (Electric).—An officer writes that during 1912 this company built three miles in the province of Quebec from St. Lambert to Greenfield Park, and work is now under way electrifying the Central Vermont from Greenfield Park to Richelieu, 15 miles. The new line has been built in connection with the electrification of the present Central Vermont from St. Lambert to Richelieu. Surveys have been made to build in the spring of 1913 from St. Cesaire to Granby, 15½ miles, and to electrify the 15 mile section from Richelieu to St. Cesaire. The company has also laid ½ mile of second track in the rearrangement of the yard at Carbarn.

NEW MEXICO ROADS (Electric).—According to press reports plans are being made to build from Cloudcroft, N. Mex., southeast to Carlsbad, about 100 miles. The line is to follow the Penasco river most of the way, and the plans include the construction of a hydro-electric plant on the Penasco river to provide power for the operation of the line. Morgan Hand, Kansas City, Mo., of the General Electric Company, and D. C. Carroll are said to be back of the project.

NORTH SHORE RAILWAY & NAVIGATION COMPANY.—Surveys have been made to build an extension from Richibucto Head, N. B., to Snowshoe Lake, 44 miles.

PACIFIC ELECTRIC.—This company during 1912 finished work on five miles of new main line at various points, including small extensions, and is planning to build from Van Nays, Cal., to San Fernando, 7.57 miles; at Pasadena, 1.03 miles, and from Riverside to San Bernardino, 6.80 miles. Surveys have been made from Upland to San Bernardino, 23.30 miles. This includes the Los Angeles Pacific, which is now consolidated with the Pacific Electric.

PACIFIC GREAT EASTERN.—An officer of this company, which was organized some time ago, to build from Vancouver, B. C., north to the Grand Trunk Pacific at Fort George, about 350 miles, writes that sub-contracts have been let as follows: To P. Welch, for a 4-mile section from a point at the junction of the Squamish and Cheakamus rivers, up the valley of the Cheakamus river; from this section northeast to McCall & Wilson, 7 miles; McGowan & Murcheson, 5 miles; McGillivray Brothers, 5 miles; McAlpine & Cunningham, 5 miles. There remains a section of 5 miles in the valley yet to be let. Sub-contracts have also been let for work west from Lillooet as follows: to John Moran; D. D. McPhee & Co.; Kennedy & Austin; Welch, Nicholson & Timlick; Burnes, Jordan & Company; James A. Welch, and Peter Salvis. John Callaghan is chief engineer, Vancouver, B. C. (October 11, p. 710.)

QUEBEC, PORTLAND & INTERNATIONAL SHORT LINE.—Application has been made in Canada to incorporate this company. The plans call for building from La Patrie, Que., to the International boundary line, thence along the valley of the North river to a junction with the Maine Central or the Canadian Pacific in Eaton township, Quebec. Pringle, Thompson & Burgess, Ottawa, Ont., are the solicitors of the applicants.

SAN FRANCISCO-OAKLAND TERMINAL (Electric).—An officer writes that this company has laid 5.13 miles of new main track during 1912, and 7.91 miles of second track in Alamedo and Contra counties, Cal.

TEXAS-LOUISIANA TRACTION.—This company, which was recently organized in Texas with a capital of $1,000,000, to build from Longview, Tex., east via Marshall to Shreveport, La., about 65 miles, it is understood has decided to continue the line south to Mansfield, La. Financial arrangements are said to have been made. A. B. Blevins, Shreveport, is a promoter. (See Texas Roads, October 11, p. 710.)

TEXAS ROADS (Electric).—According to press reports surveys have been made and work is to be started about the first of next year on a line between Gainesville, Tex., and Sherman, 29 miles. The tracks of the North Texas Traction Company will be used

to enter Sherman. J. L. White, Dallas, is said to be interested.

An electric line is projected from Denison, Tex., north to Durant, Okla., about 30 miles. Also a street system of electric lines in Durant. The plans call for building a bridge over the Red river. John R. Cullinane, St. Louis, Mo., is said to be interested.

Wetaskiwin, Yellowhead & Revelstoke.—This company has asked for incorporation in Canada to build from Wetaskiwin, Alta., westerly to the Saskatchewan river, thence following the Brazeau river valley and along the Rocky river valley to Yellowhead Pass, thence westerly and southwesterly through the valley of the Columbia river to Revelstoke, B. C. Loggie & Manley, Wetaskiwin, Alta., are solicitors for the applicants.

RAILWAY STRUCTURES.

Cincinnati, O.—A contract for preliminary work on the proposed union depot has been let to Winston & Company, of Richmond, Va.

Danville, Ky.—Modern reinforced concrete coal chutes of the bucket hoist type, each with a capacity of 500 tons, are to be erected by the Cincinnati, New Orleans & Texas Pacific at Danville, Ky., and at Oakdale, Tenn., to replace the present facilities. The improvements at Oakdale will include the installation of a sand and water station, while a sand station will be included at Danville. Some changes in the arrangement of yard tracks to meet the new conditions will be necessary at both Danville and Oakdale. Additional facilities are to be provided at Lexington, Ky., consisting of an 80-ft. turntable and pit and additional tracks.

Evansville, Ind.—The Chicago & Eastern Illinois is building a $40,000 freight warehouse, to replace one destroyed by fire.

Lexington, Ky.—See Danville, Ky.

Marietta, Okla.—The Gulf, Colorado & Santa Fe has awarded a contract for a new passenger station of brick and concrete construction.

Oakdale, Tenn.—See Danville, Ky.

Pocatello, Idaho.—The Oregon Short Line is rebuilding the car shops which were destroyed by fire a few weeks ago, and plans have been made for enlarging the shops in the spring.

Port Mann, B. C.—It is announced that the Canadian Northern proposes to spend $2,500,000 on new terminals at this plant, including 60 miles of freight yard tracks, extensive repair shops, a 20-stall roundhouse, freight sheds and several auxiliary buildings.

Portland, Ore.—The Oregon-Washington Railroad & Navigation Company has announced preliminary plans for a new freight house, to cost approximately $200,000.

St. Louis, Mo.—The Terminal Railroad Association of St. Louis is preparing plans for a terminal passenger station for the use of the electric lines crossing the Eads bridge.

Tacoma, Wash.—Plans are being made by the Chicago, Milwaukee & Puget Sound for a new passenger station to be built on a site 280 ft. square.

Vincennes, Ind.—Work has been started on the construction of a union passenger station for the Baltimore & Ohio Southwestern, Cleveland, Cincinnati, Chicago & St. Louis, Chicago & Eastern Illinois, and Vandalia.

West Duluth, Minn.—Work has been started on the new passenger station for the Northern Pacific, which was ordered by the State Railroad Commission.

New Line for Siberia.—The new Koltshugino-Barnaul-Pavlodar line, in the Altai district in southern Siberia, has received the sanction of the Russian government. The new line, which will be constructed by foreign capitalists, is to provide coal for the Altai Railway and those parts of the Altai district which lack fuel because of the absence of forests. The Koltshuginsk coal mines, now shut down, will be reopened and will no doubt immensely benefit by the building of the new railway. The Koltshuginsk mines are said to contain millions of tons of the finest coal.

Railway Financial News.

Atlantic & Danville.—See Southern Railway.

Boston & Maine.—The directors have appropriated $2,000,000 for new locomotives and $800,000 for block signal installation.

Chicago, Rock Island & Pacific.—This company has sold $5,100,000 equipment notes, series G, dated July 1, 1912, maturing semi-annually to July 1, 1927.

Colorado Midland.—George W. Vallery, president, has been appointed receiver on the application of the Central Trust Company of New York, trustee of the first mortgage bonds.

Detroit, Toledo & Ironton.—The sale of this property, which has been postponed from time to time, is again postponed from January 8 to February 5. The road is to be sold in parcels.

Denver, Northwestern & Pacific.—A new company, the Denver & Salt Lake, has been formed to take over the property under reorganization. The chairman of the board of the new company is to be F. S. Pearson, and Newman Erb is to be president. Mr. Erb is to select two members of the board of directors; Benjamin Strong, Jr., is to represent the noteholders, and the Denver interests are to select two directors. The property is to be sold under foreclosure. The collateral securing the $3,500,000 6 per cent. notes of the Denver Railway Securities Company, which consisted of $4,000,000 Colorado-Utah Construction Company notes, guaranteed by D. H. Moffat, has been sold for $2,400,000.

Denver & Salt Lake.—See Denver, Northwestern & Pacific.

Denver Railway Securities Company.—See Denver, Northwestern & Pacific.

Grand Trunk Pacific.—W. T. White, minister of finance for Canada, has announced that he will introduce a bill in the Canadian parliament to permit his using the surplus in the Canadian treasury for the year 1912 to buy the 3 per cent. bonds of the Grand Trunk Pacific. There are £7,200,000 ($36,000,000) of these bonds outstanding, guaranteed principal and interest by the Dominion government, and the "implementing clause" provides that the government must make up the difference between the selling price of the bonds and par to the railroad company. It is considered cheaper for the government to buy these bonds than to pay the difference in price to the company between what the bonds could be sold for by the company, which it is estimated would be in the neighborhood of 74, and par.

New York Central & Hudson River.—See an item in Court News in regard to the sale of the Rutland by the New York Central & Hudson River to the New York, New Haven & Hartford.

New York, New Haven & Hartford.—See an item in Court News in regard to the sale of the Rutland by the New York Central & Hudson River to the New York, New Haven & Hartford.

Reading Company.—A quarterly dividend of 2 per cent. has been declared on the stock of this holding company for the Philadelphia & Reading Railway and the Philadelphia & Reading Coal & Iron Company. This places the stock on an 8 per cent. annual basis as compared with the previous 6 per cent. annual rate.

Rutland.—See an item in Court News in regard to the sale of control of this company by the New York Central & Hudson River to the New York, New Haven & Hartford.

Southern Railway.—The Atlantic & Danville has brought suit against the Southern Railway to enforce the provisions of the lease of 1899, and the circuit court has overruled a demurrer by the defendant alleging that the court did not have jurisdiction. In the suit it is claimed that the Southern Railway has failed to maintain and replace certain equipment, and has failed to maintain certain branch lines.

Union Pacific.—The government has announced that it will not accept a plan of dissolution of the Union Pacific-Southern Pacific that provides for the distribution of Southern Pacific stock to Union Pacific stockholders.